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USSR Report

MILITARY AFFAIRS

No. 1802

AVIATION AND COSMONAUTICS

No. 7, July 1983

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Except where indicated otherwise in the table of contents the following is a complete translation of the Russian-language monthly journal AVIATSIYA I KOSMONAVTIKA published in Moscow.

CONTENTS

GREATER AIR FORCE PERSONNEL VIGILANCE URGED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 83 (signed to press 2 Jun 83 pp 1-2

[Unattributed lead article: "Increase Vigilance and Be Alert"]

[Text] Our great homeland is seized by the enthusiasm of unprecedented building. The entire toiling people is working persistently to implement the socio-economic program drawn up by the 26th CPSU Congress. The 80th anniversary of the 2nd Congress of the RSDWP -- an important event in the history of the Leninist Communist Party and Soviet State -- is being widely celebrated everywhere.

Complex and important combat and political training tasks are being performed with great patriotic enthusiasm, persistent efforts are being made to improve fighting skills, and an all-out effort is being made to increase the vigilance and combat readiness of our pilots, navigators, engineers, technicians, mechanics, and personnel of support subunits. Unanimously endorsing the domestic and foreign policy of the CPSU and Soviet Government, They are vigilantly guarding the historic achievements of socialism. Aviation personnel are guided in this noble undertaking, alongside other documents and decisions by party and government, by the CPSU Central Committee decree entitled "On the 80th Anniversary of the 2nd RSDWP Congress," which notes in particular: "Consistently defending the cause of peace and security of peoples, the CPSU and Soviet State at the same time realize that until such time as imperialism abandons its efforts to tip the established balance of forces and gain military superiority, it is important to provide the Soviet Armed Forces with everything they need to defend the USSR, its allies and friends. Following the behests of Lenin, the Communist Party and Soviet State are inalterably displaying a high degree of vigilance and are taking requisite measures to strengthen the defense capability of our homeland."

Drawing the proper conclusions from the instructions of our party's Central Committee and Soviet Government, and considering aggravation of the international situation, commanders, political agencies, headquarters, party and Komsomol organizations, as well as all Air Force personnel are working persistently to increase their political vigilance and are strengthening our country's defense capability. The source for today's heightened nuclear danger is the most aggressive imperialist circles, which have twice now plunged mankind into

the abyss of world wars but have failed to draw the necessary conclusions from the lessons of history. Impossible dreams of world domination and hatred of freedom and progress also move today's "crusaders" from across the sea. The militaristic megalomania of the present U.S. administration is pushing the Pentagon to accomplish a sharp buildup of all mass destruction weapons. Washington is inventing more and more new versions of initiation of nuclear war.

Ignoring historical changes and the new correlation of forces in the world, U.S. ruling circles are endeavoring at all costs to bring an end to détente, pursuing a dangerous policy of confrontation and arms race.

Considerable alarm and legitimate indignation have been evoked throughout the world by the intention of the U.S. President to build a new, gigantic antimissile weapon system, to be deployed on earth and in space, which would enhance the U.S. first nuclear strike potential.

The developing international situation obliges peace-seeking forces to keep a vigilant eye on the aggressive aspirations of imperialism. In view of the existing distribution of forces in the world, the threat of imperialist aggression, and aggravation of the ideological struggle, the Communist Party of the Soviet Union is displaying tireless concern for maintaining at an adequate level the defense capability of the world's first socialist state and is continuously indoctrinating our people and Armed Forces personnel in a strong spirit of revolutionary vigilance, readiness and willingness to offer a devastating rebuff to any and all intrigues by imperialism.

The ideological and psychological warfare being waged against the USSR and the nations of the socialist community demands a steady increase in political vigilance on the part of Soviet servicemen, including aviation personnel. In these conditions commanders, political agencies, party and Komsomol organizations are called upon to develop in a systematic manner the political maturity and class vigilance of Air Force personnel, to instill in them a burning hatred toward the enemies of socialism, peace, and social progress. Communist conviction, ideological firmness, and total dedication to the party and socialist homeland constitute a solid foundation for forming a high degree of vigilance in military aviation personnel and their political maturity. "Our duty," states the CPSU Central Committee decree entitled "On Further Improvement of Ideological and Political Indoctrination Work," "is to counter the subversive political and ideological activities of the class enemy and his vicious slander against socialism with unwavering cohesiveness, powerful ideological unity of our ranks, deep conviction and political vigilance on the part of each and every Soviet citizen, his readiness and willingness to defend the homeland and the revolutionary achievements of socialism." This was reconfirmed by the June (1983) CPSU Central Committee Plenum.

Vladimir Il'ich Lenin stressed time and again that vigilance is manifested in the ability correctly to gain one's bearings, to expose all intrigues by the reactionaries, whatever cunning and resourceful devices they may employ, in strictly guarding party, state, and military secrets, and in taking all precautionary measures to nip in the bud antisocialist, counterrevolutionary actions by the enemy.

Continuous combat readiness is a foremost indicator of indefatigable vigilance for aviation personnel, just as for all Soviet servicemen. The more effective is the air, tactical, and weapons proficiency of aviation personnel, the greater the quality of performance and stability of performance results, the more solid is the combat readiness of crews, squadrons, and units, and the stronger is the inviolability of our homeland's borders. Utilizing every hour of training classes and flight operations with maximum yield, and permitting no unnecessary relaxation of demands or simplifications, aviation commanders, political agencies, party and Komsomol organizations are waging an implacable campaign against complacency and irresponsibility.

The time factor is presently of the greatest importance for increasing vigilance and combat readiness. Today the enemy's modern offensive weapons and their increased maneuver and fire capabilities means that not only minutes but seconds count as well. Therefore instilling in personnel exceptional vigilance and the endeavor to reduce the time required to become combat ready and to utilize this factor to the fullest should constitute a special, priority task for commanders, political workers, and headquarter staffs of aviation units and combined units. "In order to accomplish this task with honor," stresses USSR Minister of Defense MSU D. F. Ustinov, member of the CPSU Central Committee Politburo, "it is necessary constantly to maintain a situation in the Armed Forces branches which will ensure that servicemen have a strong sense of personal responsibility for the assigned task and for the state of combat readiness of their unit, combined unit, headquarters and directorate."

An important role in forming political vigilance and continuous combat readiness is played by moral-political and psychological conditioning of aviation personnel. The vigilance and combat readiness of Air Force personnel are manifested in the attitude on the part of pilots, navigators, engineers, technicians, and junior aviation specialists toward their professional duty, in their ability to be cool and composed at all times, in their preparedness for immediate combat action, and in exemplary fulfillment of the demands of the military oath and regulations as well as the orders of their commanders and superiors.

They are profoundly cognizant of this in the regiment in which S. Kondrat'yev serves as party committee member. At the initiative of the party committee, matters pertaining to increasing vigilance and combat readiness are regularly discussed in the subunits at party meetings, bureau sessions, seminars, and conferences on theory and special evening activities are devoted to them.

Party member officers E. Karabanov, A. Gordeyev, N. Kaydalov and others devote great attention in ideological and political indoctrination work to developing class self-awareness in the men and toward instilling ideological staunchness, political maturity, readiness and willingness honorably to carry out their duty to the homeland. In political education classes, at political briefing sessions, in lectures and discussions they explain to the men Lenin's behests on the need to be on the alert at all times, the demands of the 26th CPSU Congress on the armed defenders of the socialist homeland, brief them on facts attesting to the aggressive intrigues of the United States and the other NATO countries, and expose the insidious devices and methods employed by the imperialist intelligence services. Through the joint efforts of the commanding

officer, political workers, party and Komsomol activists, an atmosphere of implacability toward any and all manifestations of complacency, slackness and dulling of political vigilance is being maintained in the regiment.

Vigilance and, consequently, combat readiness as well depend in large measure on the degree to which personnel have mastered the equipment and weapons, how skillfully and efficiently they operate them, and how conscientiously they care for them. The most serious importance is attached to these matters in the majority of Air Force units. Commanders of flights, squadrons, and regiments, as well as all personnel should be firmly aware of the fact that only by thoroughly studying and mastering the operational capabilities of an aircraft, equipment and systems as well as the most effective methods and modes of combat actions in various situations are aviation personnel capable of successfully accomplishing the assigned mission.

In training personnel it is important to concentrate principal efforts on further improving the quality of combat training and on devising and applying new tactics meeting the demands of today's dynamic and intense air combat. The center of attention of commanders, staffs, and political agencies should be focused on matters pertaining to mastery of new equipment by aviation personnel, its skillful utilization, and rigorous observance of flight safety regulations. Today particular responsibility for guarding the airspace of the socialist homeland is borne by personnel standing alert duty, which constitutes performance of a combat mission even during peacetime. A high degree of political awareness and vigilance, Communist conviction and faithfulness to one's constitutional duty determine the actions of aviation personnel on alert duty, their readiness and willingness to devote all their knowledge and energies to exemplary performance of assigned missions. This is why commanders, political agencies, party and Komsomol organizations are called upon thoroughly to explain to personnel the importance of alert duty to their nation and to instill in them a feeling of personal responsibility for the security of the homeland, resoluteness, vigilance, aggressiveness, organization, and discipline.

Many aviation units have amassed experience in such activities. They are conducted effectively and purposefully, for example in the fighter regiment in which military pilot 1st class officer V. Trufin serves. In this regiment the command authorities and party activists regularly brief the duty crews and the specialists providing them with combat support on the present international situation and the demands of the CPSU and Soviet Government pertaining to combat readiness of Air Force subunits and units. Serious attention is devoted to air proficiency, study of the tactics and performance characteristics of offensive aircraft, and the ability promptly and accurately to discern the intentions of the potential adversary and to learn to destroy him at a maximum distance from defended installations.

Vigilance and combat readiness are indivisible. This thought runs strongly through the lectures and discussions, wall newspapers and visual propaganda. Great importance is attached to strengthening discipline, without which it is inconceivable to coordinate the efforts of alert-duty aircrews, command post/tower, and other specialists operating complex aviation systems.

To be vigilant means to guard military and state secrets closely and to refuse to tolerate specialists who display a diminished sense of responsiblity for keeping secret the information entrusted to them pertaining to their jobs. We cannot ignore instances of even the slightest carelessness and disorganization on the part of isolated servicemen. It is very important to ensure precise observance of the prescribed procedures and regulations pertaining to radio and telephone communications, postal correspondence, and the requirements specifying procedures of handling documents and special literature. Commanders, political workers, party and Komsomol organizations should give a strict, firm, party-minded response to each and every instance of carelessness and dulling of vigilance.

Party-political work directed toward instilling in aviation personnel ideological conviction, political awareness and the responsibility of each individual for the common success, and implacability toward bourgeois ideology, is called upon to exert increasingly more active influence on boosting vigilance and strengthening combat readiness. Communists, who are responsible for this serious job, must achieve a high degree of effectiveness of party-political work, persistently seek the most effective forms and methods of party influence on personnel, efficiently synthesize and promptly adopt in a practical manner all new and advanced developments engendered by innovative thought and by the activeness of commanders and political workers. It is the duty of party and Komsomol organizations to ensure exemplary performance by Communists and Komsomol members in increasing vigilance and in instilling in all personnel a feeling of responsibility for exemplary performance of duty.

Today, in the course of intensive summer training, aviation personnel are making every effort in order to honor in a worthy manner a traditional holiday of the Soviet people -- USSR Aviation Day. They are successfully campaigning to meet socialist pledges and for excellent subunits and units. Constantly improving their skills and making an all-out effort to increase combat readiness, Air Force personnel are displaying a high degree of vigilance. The Communist Party calls upon them to do this, as does their constitutional duty to the homeland and people.

3024
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SQUADRON COMMANDER ADMITS POOR MIDAIR REFUELING HOOKUP

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 83 (signed to press 2 Jun 83) p 3

[Article, published under the heading "Political and Military Indoctrination," by Lt Col N. Stupnev: "Hold Yourself Strictly to Account"]

[Text] Squadron commander Lt Col A. Kurilets spotted the silvery dot in the sky which was the aerial tanker, as soon as his missile-armed aircraft entered the designated rendezvous area. The dot rapidly grew in size as it approached, and finally the two aircraft were flying side by side. They could proceed with the hookup. The fueling hose proceeded to extend from the tanker like a flexible snake. Soon the pilot was informed by the weapons officer that the hookup was accomplished. Kurilets was about to give the command to start pumping, but at this moment the hose broke free. It was necessary to repeat the linkup procedure. And although the second attempt proved successful, Anatoliy Maksimovich was not satisfied with the mission.

After landing, while the ground crew was receiving reports from the aircrew on the operation performance of equipment, systems, and instrumentation, Lieutenant Colonel Kurilets analyzed all elements of the flight and the midair refueling. Why had it not succeeded on the first try? Had there been excessive haste? No. Both he and his assistant had performed calmly and prudently. All commands had been clear and concise. Could there have been an error in piloting technique? Perhaps the reason was to be found here! Anatoliy Maksimovich had noted at the time that at the moment of hookup with the tanker, the spacing between the aircraft was somewhat closer than normal.

What should he do: say nothing about the annoying error and pretend that nothing had happened, or discuss the incident in detail with everybody? It was an unpleasant prospect to admit his mistake to his fellow pilots; after all, he was the squadron commander and a member of the party committee, and it would seem unfitting to undermine his reputation with his men. But the voice of conscience insisted that everybody is equal when it comes to proper flying procedures and he, a leader-Communist, should not conceal something which could happen to anybody. In analyzing mistakes made by subordinates, Kurilets had said to them repeatedly: "Hold yourself strictly to account, and the mistake will not be repeated." He could not remain silent!

...The postmission critique commenced. In frankly telling about his error, the squadron commander naturally was concerned about how people would take his confession. He did not note any surprise in the eyes of his men, however. The pilots, who performed the same tasks, realized that since their commanding officer had begun the critique with himself, a good deal could be learned from this.

One certainly will not gain respect just from critiquing one's mistakes. This merely aids in training and indoctrinating one's men. The main thing is to be at the forefront at all times, to display a personal example in all things, to find the right approach to each and every aviator, to help him believe in his ability at a time of difficulty. And of course one must approach everything with a high degree of demandingness. Anatoliy views precisely this as his function as a leader-Communist, his lofty mission as a commander-indoctrinator.

...Capt V. Rudnik was standing before the squadron commander, and Kurilets could see by his face that the pilot was sincerely upset by what had happened. A serious error had been made: Rudnik had failed to switch on one of the aircraft's systems prior to takeoff, although he had informed the pilot that the system was operating. The error was not discovered until the last moment. As a result the mission was scrapped, and the aircraft taxied back to the flight line.

Anatoliy Maksimovich knew that Rudnik was a knowledgeable, disciplined, intelligent specialist. "How should I handle this?" the squadron commander pondered. "This officer is in trouble as it is. The higher commander has decided to pull Rudnik off the line and reassign him to a ground job."

"You must learn to answer for your mistakes," Lieutenant Colonel Kurilets firmly stated, feeling that precisely this might save the pilot and return him to a flying job.

These words deeply hurt Rudnik. One can take anything, but to lose the respect of one's commanding officer.... He had never imagined it would come to this.

Sensing a change in the captain's mood, the lieutenant colonel softened his approach: "Demonstrate your right to fly with an excellent job performance on the ground. I am confident that you will succeed...."

He noted that he had hit the nail right on the head. Familiar with Rudnik's character and personality, Kurilets was now sure that the latter would get back in the air.

Time passed. Anatoliy Maksimovich did not forget about this officer. He could see that Rudnik was dying to get back flying. This would have been the end of another in his place, but he was made of sterner stuff. The experience was painful, but he was doing the work of three men. This meant that he had not lost hopes of getting back in the air. And if this was the case, he should give him support.

The squadron commander's report was received sympathetically at unit headquarters, because they knew that Kurilets was truly concerned about his subordinate. The higher commander also took this fact into account. After talking to the squadron commander, he signed an order reinstating Rudnik to flight duty. Soon he was once again flying with his crew.

Strict demandingness on himself and on others as well as concern for people.... These qualities help Anatoliy Maksimovich achieve success in combat training and socialist competition and help him lead his men from one performance level to the next. He has a right to be proud. Lieutenant Colonel Kurilets performs all training missions flawlessly, and he therefore enjoys deserved respect in his unit. He has been awarded the decoration "For Service to the Homeland in the USSR Armed Forces," Third Class, and for several years in a row, aviation personnel have been electing him to the unit party committee.

Mastering the finer points of combat expertise, Anatoliy Maksimovich generously shares his wealth of experience and know-how with his men. And the men of his squadron are doing an excellent job of operating their complex modern aircraft, doing an outstanding job of flying, with no air mishaps. The subunit contains many master proficiency-rated individuals, and the majority of pilots and navigators are highly proficiency-rated specialists.

Lieutenant Colonel Kurilets works in close contact with party activists. He is fully aware that if he did not have by his side in the subunit such Communists as G. Pasynkeyev, A. Shmatko, V. Antonov, B. Berezkin, and others, it would be more difficult to lead the squadron to outstanding competition performance results and successfully to accomplish combat training tasks.

They are also concerned with dissemination of advanced know-how. Let us say that an aircrew has employed a new tactical device in performing a live missile firing. The squadron commander, together with the political worker and party bureau secretary, immediately arranges for a demonstration, analysis, and exchange of know-how with other crews. And this proves beneficial. Officer I. Pelipenko's crew, for example, utilizing at the next tactical flight exercise the experience of their comrades in arms, delivered a precise missile strike on an "enemy" target.

The work experience of this vanguard squadron commander has been synthesized and adopted in other of the unit's suburits. Anatoliy Maksimovich has spoken on numerous occasions at party committee meetings, party meetings, and job-related conferences and has shared his ideas on improving methods training of crew and detachment commanders. His suggestions essentially boil down to ensuring continuous and effective monitoring of the training of aviation personnel, with party-minded demandingness.

Other leader-Communists can learn a great deal from this commander of an excellent-rated squadron. And he in turn adopts from them all the finest and progressive things, because they all have a common, lofty and noble goal: to produce reliable defenders of our great socialist homeland.

3024
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PROPER FIGHTER PILOT INDOCTRINATION PROCEDURES OUTLINED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 83 (signed to press 2 Jun 83) pp 4-5

[Article, published under the heading "Seeking a High Degree of Combat Readiness," by military pilot 1st class Maj V. Serpov: "Attacking Before He Attacks You"]

[Text] When a fellow joins a new outfit, he cannot help but compare it with his previous unit. Military life and routine, the tasks performed by the subunit, and the specific features of the job all seem to be the same, but the people are different. How soon the new arrival, especially if he is a commander, establishes contact with them determines in large measure the length of his period of familiarization and his subsequent job performance.

There is a great deal of work to do, and sometimes there are misunderstandings during a commander's period of familiarization. But it also has an attractive aspect: successes and shortcomings are clearly evident against the background of one's new job concerns, and it is also easier critically to reexamine one's attitude toward certain aspects of job-related duties. As we know, a standard approach is intolerable in working with people: each individual requires an individual approach. But when one encounters a situation similar to that which one has already experienced, it is much easier to gain one's bearings and to find the correct solution.

Usually acquaintance with one's subordinates begins with a study of the personnel file. A certain opinion of people is formed. It sometimes changes upon personal acquaintance. It is therefore very important to endeavor to gain an understanding of a person's inner world and to avoid drawing preconceived conclusions. It seems to me that the principal task of the commander in indoctrination is skillfully to guide the actions of his subordinates, to teach them independently to analyze every decision and action, and to lead them purposefully toward the designated objective. Setbacks may occur at first, but if a commander adheres strictly to this line of policy, success will come along with experience.

I remember when I was made a flight leader. The first thing I did was thoroughly examine the files on my subordinates -- Senior Lieutenant Dudkin and Captains Shevchenko and Golovlychuk. All indications were that they were excellent

officers. But at first things did not go as smoothly as I had hoped. For example, at one time things were not going well with Sr Lt S. Dudkin. Energetic and sociable, he got along well with people, but haste sometimes prevented him from making the correct decision.

Once when returning from the practice area Dudkin miscalculated his procedure turn and ended up to the right of the localizer. The outer marker audio signal sounded. The pilot veered sharp left, trying to get onto the localizer, but went past it. During this time he was not paying attention to his instruments and, as a result, reached the middle marker above the glide path and at excessive speed. He flared high and touched down too far down the runway.

It would seem that the simplest thing to do would be to correct the error by executing a missed approach and trying again. But the pilot's hastiness had led to additional errors, and he lacked the time to make a correct decision.

Of course the senior lieutenant's actions were critiqued in detail in the flight; we advised him what he should have done and where he should have focused his attention. Dudkin, however, viewed the incident as a trivial error. Soon his cavalier attitude caught up with him.

When flying in zero visibility Dudkin would sharply bank his fighter back and forth. We pointed out time and again to him that flying like that can cause pilot disorientation, but he remained skeptical.

"I don't know what you're talking about. I am in no danger of disorientation," he replied in self-justification. "To attack before he attacks you, you have to turn fast to the right heading."

On a dual IFR check flight the instructor noted that the aircraft was in a 20 degree bank when it was supposed to be flying straight and level.

"Get it straight and level," he ordered the pilot.

The plane returned to straight and level, but a few seconds later the artificial horizon again showed a 20 degree bank.

The instructor realized that the senior lieutenant was disoriented. This happens frequently and presents no problem if one proceeds correctly. But Dudkin had forgotten everything. His superior was forced to take over the controls. He straightened the aircraft, smoothly executed several turns, and Dudkin's orientation returned. The senior lieutenant performed the rest of the flight and the landing flawlessly.

"In combat you are not going to 'pancake' turn. Even in the soup!" He exploded angrily after taxiing back to the flight line. "A fighter should attack before he attacks you."

It was necessary to explain to this pilot the difference between new maneuvers and ones which had already been mastered. It is noteworthy that Dudkin easily and quickly grasped new things, but his desire to achieve the optimal result

as quickly as possible ruined everything. Today he is a sensible, knowledgeable pilot. He recalls his past setbacks with a smile.

Capt B. Shevchenko helped him a great deal at the time. Calm and composed in any situation, he responded sensitively to the reverses of his comrades. This officer somehow became Dudkin's constant companion. They could always be seen together -- at briefings, at the messhall, and at the gym. In the evenings he would frequently visit his comrade. They would have heart-to-heart conversations about what they wanted out of life, about the pilot's difficult job, and about plans for the future.... And Sergey Dudkin's behavior began to change. No longer did he display impatience and haste in his actions.

"He is like a new man!" Capt V. Goloviychuk once said jokingly. "Now attack him before he attacks you...."

Goloviychuk's opinion was valued in the outfit. One could count on this officer on the ground and in the air, in all things. It is not surprising he was awarded the Komsomol Central Committee Military Valor Badge. Although Viktor is heavily loaded with volunteer activities, he always manages to get things done. There was not a single occasion where he was not fully prepared for flight operations.

Time seems simply to fly by during busy days of combat training. There finally arrives the day of a tactical flight exercise, at which the unit will show what it has accomplished.

Such was the case this time as well. We prepared thoroughly for the exercise. We practiced air combat as a two-aircraft flight, as a full flight, and studied every detail of the gunsight and navigation system and weapons procedures. The veteran pilots told the newcomers about the specific features of such exercises and gave them advice on how to put in a good performance in a complex tactical situation.

The ground crews also did a great deal of work during this period. Under the supervision of officer V. Svintitskiy, the ground crew specialists adjusted the fighters' systems and gear.

Following parting words by their commanding officer, they would fly to another field. They would cross many air corridors and flight levels en route. It was therefore necessary to provide for every eventuality and to be particularly alert.

The fighters took off, assembled in formation, and set out for their destination. Everything proceeded as planned. The pilots accomplished the flight in excellent fashion and landed at the designated field.

Flight operations following the exercise schedule began on the following day. Periodically the sun-heated air shuddered from the roar of afterburners. Fighters took to the air one after the other. Finally our turn came. Dudkin and Goloviychuk had rehearsed things to perfection. Captain Shevchenko also took off to intercept an aerial target.

The two-aircraft flight reached the target search area. Captain Shevchenko was following the flight leader in the prescribed formation. The ground controller gave the pilots a turn command. Following its execution came the command "Afterburners!". Accelerating, the fighters swept toward the target intercept point.

A mission to destroy a radio-controlled drone differs in many respects from a practice intercept. The main thing here is the pilot's psychological mood. While on a practice mission certain departures from reality are possible, when going for an actual kill they are out of the question. The pilot knows that when he pushes the button he will not be activating a gun camera but will be firing a cannon, or else a missile will streak forward from under his wing. And if he misses it will not be simply an analysis of his error. He will long be forced to endure the reproachful gazes of his comrades.

All this compels a pilot to get a clamp on his will, to merge with his aircraft, to subordinate everything to the main objective -- to destroy the "aggressor."

...Captain Shevchenko dropped back slightly from his flight leader and closely watched his actions.

"Target left, range...," came the voice in the headphones.

At that very second the pilots spotted the target: it was turning.

"We are attacking!" Shevchenko heard.

The flight leader's fighter executed a vigorous turn. He was now within range. He could fire....

But, banking away, the flight leader pulled out.

"Attack!" he commanded Captain Shevchenko.

He adjusted to the situation immediately. There were no longer any doubts. A swing left -- and the drone was in his sights. He squeezed off a burst of cannon fire. The fiery streamer pierced the drone's silhouette, and the following instant it exploded into a whitish cloud, from which shapeless fragments were tumbling groundward. Mission accomplished!

This exercise graphically demonstrated how important in our job are solid knowledge, firm professional skills, mutual assistance, and confidence in one's abilities. These qualities are acquired through painstaking labor, continuous quest, and persistence on the part of commanders and subordinates. I would say that the main thing is not to stray from the designated path, to maintain at all times conduct which has been verified by one's own conscience. If you know how to do it, teach somebody else, if you have done it, help a comrade, and what today has been done well tomorrow should be done even better. In my opinion this is a reliable guarantee of professional growth. And if a commander has succeeded in convincing his subordinates of this, he is halfway home. He is not simply teaching and indoctrinationg -- he is preparing fellow warriors on whom he can count in combat, in any, even the most complex tactical situation.

3024
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IMPORTANCE OF AIRCREW PHYSICAL FITNESS STRESSED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 83 (signed to press 2 Jun 83) pp 6-7

[Article, published under the heading "For a High Degree of Combat Readiness," by Col I. Shtan'ko, chief of Air Force Physical Training and Sports: "The Road to Health and Stamina"]

[Text] Since the very birth of aviation, a pilot's health is considered to be one of the principal indicators characterizing his capability to master a difficult profession and subsequently, over a period of many years, to perform his assigned tasks with excellent quality. And it is not surprising that physical training has been and continues to be an integral part of combat training in military aviation.

The Air Force has developed a well-structured system of organization of physical training and athletics. Physical exercise, athletic workouts, and mass competitions, including in the aviation sports, are important means of improving the flying proficiency of aviation personnel, for successfully mastering a military occupational specialty, and for extending one's flying career. Good physical training of personnel, particularly flight personnel, is one of the factors in the combat efficiency of aviation units. A pilot's ability successfully to fly not two or three missions but four, five and more is a mighty additional reserve potential for the conduct of combat operations.

Commanders and political workers, staff officers, party organizations and sports committees devote much attention to physical conditioning of military personnel, development in units of mass sports which are of great applied military significance, improvement and efficient utilization of athletic training facilities. The experience and know-how of vanguard regiments and military educational institutions is broadly disseminated in aviation units and combined units and at Air Force higher educational institutions. Training methods conferences are held for physical training and athletics officers, as well as scientific conferences. Departments and areas of study are staffed with highly qualified and experienced specialists. Effective forms of physical training are adopted in the training curriculum: combined exercises, extended morning calisthenics, special exercises for flight personnel, as well as individual exercise for officers.

Air Force physical training and sports service specialists provide specific local assistance in working out methods of conducting training classes, organizing mass sports activities, building and improving sports training facilities, and disseminating the advanced know-how of the best units and schools. A flight personnel physical training program is being successfully implemented, based on a new method of specialized and physical training for crew members in the specific aviation arms, taking into account improvement in their professional skills.

In addition to final inspections at the end of training periods, reviews of mass sports activities are held on a regular basis in units and at educational institutions. These measures help improve the physical conditioning of personnel and increase the number of Military Sports Complex badgeholders and category-rated athletes.

In leading units and at vanguard schools, matters pertaining to organization of physical training of personnel are closely coordinated with combat training tasks. They do a good job of developing mass sports which are of great applied military significance, and they are constantly improving athletic training facilities. This exerts considerable influence on training effectiveness and flight operations safety.

Physical training and sports in aviation are directly linked not only with strengthening the health and improving job fitness, but also with keeping pilots flying for a great many years and keeping experienced cadres on the line.

Analysis of the results achieved by units winning socialist competition in the Air Force attests to the fact that if commanding officers themselves engage actively in physical training, organize and monitor it in a skillful manner, the physical fitness of military personnel and their success in training are obvious. We can cite as an example the military units in which officers A. Shestakov, V. Demidov, V. Lyashenko, N. Kushnarev, and B. Kuzenyatkin serve.

Physical training at military educational institutions, especially flight schools, is of great importance. The conditioning and fitness acquired by young people during training is a foundation which is laid down over the course of many years. For this reason physical training of personnel enrolled at service schools is organized and conducted taking into account the tasks according to the periods of their flight training. Physical training tasks are performed in a purposeful manner at the Kachinskoye Higher Military Aviation Pilots' School and at the Kiev Higher Aviation Engineering School. The personnel of these military educational institutions invariably achieve excellent performances at inspections, reviews, and in competitions for the USSR Armed Forces and Air Force championships.

The Air Force regularly holds brief training courses designed further to improve the physical and moral-psychological training of personnel. During these activities members of aircrews practice water-landing procedures, learn skills of employing on-board emergency rescue gear, orientation and survival in remote and mountainous areas. These courses are provided with specialized gear and equipment and are staffed by qualified personnel. Physical and specialized training is conducted under appropriate medical supervision. The training

classes strengthen the health of aviation personnel, help reduce emotional stresses, and improve mental toughness. The training activities conducted at these courses constitute one of the elements of combat readiness, and one must have a completely serious attitude toward this.

And yet some commanding officers of units and flight schools still fail adequately to appreciate the importance of the activities conducted during these courses and fail to follow the rules of assigning and sending groups of flight personnel to them. Frequently groups are made up of aviation personnel from different units, senior personnel are not designated, and appropriate briefing is not given. Sometimes pilots who have just completed school or who have returned from leave are sent to these courses. Sometimes they are also sent there at the expense of leave time. It also happens that aviation personnel who have been permanently grounded from flying are sent. We cannot accept this state of affairs. Every commanding officer should be clearly aware that these courses perform important tasks of strengthening the health and improving the physical conditioning and fitness of Air Force flight personnel.

As we know, the effectiveness of physical training and mass sports activities depends on the condition of athletic facilities. In many units and at many schools gymnasiums and athletic facilities have been built with local resources and manpower. Commanders, political workers, party and Komsomol activists, people who deeply understand the important role of physical training in the combat training system should seek to arouse people's interest, to encourage them through personal example to work for this noble cause. As practical experience shows, the simplest athletic facilities can be refurbished and equipped with one's own resources and manpower. For example, air compressor facilities (UPS-16T) and heated storage facilities equipped as gymnasiums have proven quite effective: these facilities are used for holding classes in physical training, specialized training, and athletics. Construction of standard gymnasiums with all requisite auxiliary and health facilities is developing successfully, which is making it possible to conduct physical training during periods of less intensive flight operations.

We should note that one-hour physical training classes fail to produce the desired results. The fact is that a great deal of time is spent on assembling personnel, dressing and undressing, and the like. Very little time is left for actual physical training. Experience shows that two-hour classes, twice a week, for example, make it possible to increase the physical training load and to improve the general and specialized fitness of flight personnel.

But results can be even more substantial if all units and military educational institutions attach proper importance to personnel physical training. As inspections have indicated, there still occur errors of omission in organization of physical training and mass sports activities in some Air Force units and subunits in the Moscow, Baltic, Leningrad, and Transbaikal military districts. In the units in which officers M. Ovsyannikov, I. Mitrofanov, V. Tyutin, A. Barsukov, A. Kalmykov, and D. Tendintikov serve, for example, physical training classes are held irregularly, at considerable intervals, while mere lip service is given to morning calisthenics. There has not been established proper oversight over the organization of physical training, and athletic facilities are

growing quite slowly. As a consequence, the physical conditioning of military personnel leaves much to be desired. Unfortunately not everything has yet been done to increase the importance of physical training and sports in the overall system of personnel teaching, indoctrination, and combat training.

Organization of physical training and athletics in support and communications units demands particular attention. Instances have been noted where no physical training activities have been conducted for engineers, technicians, and specialists of support subunits, as well as compulsory-service personnel. And yet they must withstand considerable physical stress loads in order to preflight aircraft in short order and to maintain their working efficiency. The personnel of the following higher military aviation schools -- Armavir Flight School and Tambov Engineer School -- also displayed poor physical training performance results at inspections.

This indicates that commanders, political workers, and staff officers of these units and schools do not fully understand the importance of personnel physical training within the overall system of combat and job training.

Every unit and school has reserve potential and possibilities for further developing physical training and athletics. The only things needed are desire, suitable organizational work, and strict oversight. A serious approach to this important matter will unquestionably help develop bold, physically strong, well-conditioned defenders of Soviet airspace.

3024
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COMBINED UNIT UNIVERSITY OF MARXISM-LENINISM ACTIVITIES OUTLINED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 83 (signed to press 2 Jun 83) pp 8-9

[Article, published under the heading "Implementing the Decisions of the 26th CPSU Congress," by Maj V. Oleynik: "Directional Thrust Toward Quest: The Political Department's Experience in Directing Activities of the University of Marxism-Leninism"]

[Text] Study at universities of Marxism-Leninism is one of the effective forms of ideological-political indoctrination in the Army and Navy. They have been assigned an important role in accomplishing tasks assigned by the party in the area of ideological and political indoctrination work. Our combined unit's political department devotes constant attention to this matter.

Party and Komsomol activists, volunteer propagandists -- staffers of all political training systems -- and subunit commanders are enrolled in this university. The makeup of enrolled personnel changed significantly following the CPSU Central Committee decree entitled "On Further Improvement of Party Training in Light of the Decisions of the 26th CPSU Congress." Today applicants can be accepted to enrollment only when they successfully pass an interview not only at the commission applicant interview room but also with the subunit and unit commanding officer, political worker, and party organization secretary, and their application for enrollment in the university of Marxism-Leninism will be discussed at a general party or Komsomol meeting. The political department attaches particular importance to this procedure, since it is in conformity with the requirements of the CPSU Central Committee decree pertaining to accepting applicants to universities of Marxism-Leninism and increases the responsibility to their comrades for training on the part of future enrolled personnel.

Command authorities and the political department select as applicants for enrollment those persons who are distinguished by moral purity, excellent professional and moral-political qualities, and a desire to improve their ideological-political level. Unfortunately in the past it would happen that certain enrolled personnel would violate military and flight operations discipline as well as Communist ethical and moral standards. Of course they would be removed from enrollment, and party organizations would be instructed to reach appropriate conclusions. Due to the low level of demandingness on the part of certain commanders, party bureau secretaries and party committees, however, some individuals

receiving such punishment would not be subjected to proper criticism and action. This was the case, for example, in the subunit in which officer V. Oganyan served as deputy commander for political affairs. Adequate party demandingness was not applied to Capt V. Panasenkov, dismissed from the university for regularly failing to attend classes without valid reason. And only after unit leader-Communists were summoned to a political department hearing did they begin more rigorously overseeing study by enrolled personnel.

Excellent, businesslike relations were established between university officials, unit command authorities and party organizations. At the unit level they always are familiar with the status of studies, class attendance, and the discipline of their officers and warrant officers. University personnel attend party bureau and party committee meetings.

The political department maintains that such work is not only of an informational nature but also helps strengthen party organization oversight over the training of party members. In addition, we recommend that party organizations designate military personnel enrolled at the university responsible for specific sociopolitical measures and assign them specific lecture topics. This is how we can accomplish an important task connected with practical propagandist activities, which enrolled personnel should mandatorily conduct. Incidentally, in recent months alone they have presented several lectures and held talks and discussions with various categories of military personnel on the proceedings of the CPSU Central Committee plenums, the CPSU Central Committee decree entitled "On the 80th Anniversary of the 2nd RSDWP Congress," on Yu. V. Andropov's speech entitled "60th Anniversary of the USSR," and on vital contemporary issues.

University enrolled personnel officers V. Petrov, A. Vasil'yev, V. Smirnov, and others have proven themselves to be aggressive volunteer propagandists. Lecturing to fellow military personnel is a great responsibility. It constitutes a unique report on the quality of training offered at the university.

Speaking of the effectiveness of this training, naturally one cannot state, as V. I. Lenin stressed, that it is entirely dependent on the lecturers. The political department is very serious in dealing with the selection, placement, and training of instructors. They include unit commanders, political workers, and respected staff members from city higher educational institutions. A fine job has been done, for example, by officer-instructors G. Shchemel'kov and G. Pechkarev. They possess profound knowledge, considerable methodological expertise, practical life experience, and solid skills in propaganda and indoctrination work. Their lectures and seminars are well received by enrolled personnel, foster their ideological conditioning, and increase their intellectual breadth.

Matters pertaining to class attendance, activeness at class sessions by enrolled personnel, as well as the quality of lectures have been specifically discussed on repeated occasions in the combined unit's political department. Specific political department recommendations formed the basis for meetings by the scientific methods council of the university's departments. Particular importance is attached to effectiveness of party training. Much attention is devoted to a problems approach to teaching.

We seek to ensure that in all enrolled personnel without exception knowledge becomes transformed into conviction, embodied in their practical activities. Attending report-election party and Komsomol meetings, political department officers unanimously note the political maturity of the officers enrolled at the university, the businesslike nature of the statements made by the overwhelming majority of enrolled personnel, and a sincere desire to make a personal contribution toward increasing the combat readiness of the subunits. Many of their suggestions have formed the basis of meeting resolutions and plans for implementation response to critical comments.

The political department, attaching particular importance to the quality of classes, boosting the success rate of enrolled personnel, and improving the entire training process, suggested that the university adopt the practice of instructors dropping in on their colleagues' lectures, with subsequent discussion and critique. We should note that this form of professional training has taken hold. The officer in charge of the university, however, has had to do certain work with some instructors. Now every department regularly schedules such mutual visitations. Their results are discussed at meetings of the scientific methods council, and the council's conclusions are implemented.

The quality of classes and assimilation of material are greatly fostered by teaching methods improvements to assist university enrolled personnel, consultation sessions, and supplementary classes. In addition to the required curriculum, lectures are held for officers and warrant officers on the international situation, on Soviet laws, and on moral and aesthetic indoctrination, and get-togethers with war veterans and vanguard production workers are arranged. They focus on thorough study of the Leninist theoretical legacy and practical CPSU activities in the area of domestic and foreign policy.

Increasingly more complex tasks are assigned to the university of Marxism-Leninism with each passing year, tasks connected with further raising the level of teaching and ideological-theoretical training of officers and warrant officers. We consider one of the main conditions for improving the quality and effectiveness of training to be close contact between the university administration, combined unit command authorities and political department, and unit command authorities and party organizations. The search for and adoption of new forms of increasing the learning activeness of enrolled personnel and their mandatory participation in propagandist work continues to be an important directional thrust. It is essential that party and Komsomol organizations maintain oversight over the training of CPSU and Komsomol members. And naturally unit command authorities must take into consideration the enrolled personnel's attitude toward study. This factor, alongside others, is also taken into account when considering the matter of personnel promotions and new job assignments.

Implementation of the decisions of the 26th CPSU Congress, the CPSU Central Committee decree entitled "On Further Improving Ideological and Political Indoctrination Work," and issues connected with this continuously occupy the attention focus of university administrative and faculty personnel, combined unit command authorities and political department. And the closer the contacts between them, the greater will be the benefit to the common cause of indoctrination.

One can state with assurance that our work is producing fine results: the political maturity and activeness of aviation personnel is increasing. As a rule, university enrolled personnel display an example in performing service-related duties and their party duty, in combat training, discipline, and organization.

3024
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AGGRESSIVE U.S. POLICIES REVIEWED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 83 (signed to press 2 Jun 83) pp 12-13

[Article, published under the heading "On the Battle Fronts of the Ideological Struggle," by Candidate of Historical Sciences Maj Ya. Ren'kas: "Pursuing a Policy of Aggression"]

> [Text] The ideological contest between socialism and capitalism has always been of an implacable, relentless character, but at no time in the past has our class adversary utilized so many new, highly sophisticated devices and forms of struggle or launched offensives on such an unprecedentedly broad front. Bourgeois ideologists assign a special place in their propaganda to the notorious "Soviet military threat" and alleged preparations for war on the part of the USSR and the nations of the socialist community. They deliberately fail to mention the huge expenditures for military preparations by the United States and its NATO allies, as well as their aggressive, neocolonialist aspirations. On the contrary, they praise to the skies the U.S. military and its allegedly humane historical objectives. "It is our duty," stresses the CPSU Central Committee decree entitled "On Further Improvement of Ideological and Political Indoctrination Work," "to counter the subversive political and ideological activities of the class adversary and his vicious slander against socialism with unwavering cohesiveness, powerful ideological unity of our ranks, the deep conviction and political vigilance of each and every Soviet citizen, his readiness and willingness to defend the homeland and the revolutionary achievements of socialism."

During its 200-year history the United States has on numerous occasions appropriated new lands with the assistance of the dollar, deception and blackmail, and if this has not succeeded, it has enslaved other peoples with flame and sword, drowning their sovereignty and liberty in blood. In the 20th century the United States has become the principal tyrant endangering the world's peace-loving peoples.

V. I. Lenin repeatedly emphasized in his writings that the imperialist state and its edifice of government guards the interests of finance capital, the

politics and ideology of which are essentially highly aggressive and aimed at guaranteeing the monopolies maximum profits and consolidation of their position in the world. Armed forces are the principal instrument of the aggressive, predatory policy of U.S. imperialism. Today bourgeois propaganda is persistently attempting to foist upon the world the myth of the "glorious historical journey" of the U.S. military and its "faithful service to the benefit of the fatherland." In actual fact the U.S. military is the largest mercenary force in the Western world, intended for the performance of punitive functions both against its own people and other peoples. U.S. reactionary circles are continuously increasing military appropriations and are casting enormous funds into the maw of the arms race. Militarism has become a constant presence in the life of American society.

The aggressive, militarist course of policy of U.S. imperialism and its endeavor to crush freedom, its tendency toward dictate, despotism and, finally, wars, carry a threat to various countries and peoples. Let us turn to history. In the course of the 19th century the United States took part in almost 120 predatory wars, its army and navy conducted many thousands of military campaigns, armed invasions, landings on foreign soil, and other operations in Europe, Asia, Africa, and Latin America. The end of the 19th century was marked by the U.S. imperialist war against Spain for the purpose of seizing Spain's colonial possessions. Following this, U.S. imperialism engaged in extensive colonialist operations against patriotic forces in China, waged aggressive wars against Mexico, Haiti, the Dominican Republic, Cuba, and other countries, and crushed the national liberation movement in Guatemala, Nicaragua, and elsewhere.

The U.S. imperialists have on their record armed intervention against the young Soviet Republic in 1918-1922. Between the beginning of the 20th century and the outbreak of World War II, the United States had taken part, either directly or by supporting its stooges, in more than 30 local wars, suppression of national liberation movements, colonial campaigns, and other violent actions.

The aggressivenes of U.S. imperialism has particularly increased since World War II. According to figures published by the official Pentagon periodical COMMANDERS DIGEST, during this period the U.S. armed forces have taken part directly in 17 military conflicts and indirectly in an additional 19 conflicts. The bloody list of Washington's adventures includes the 1950-1953 war in Korea, the imperialist aggression against Vietnam, Laos and Cambodia in the 1960's and beginning of the 1970's, extensive military, economic, and political aid to Israel in its aggressive actions against the Arab countries. Today the world is shuddering from the crimes committed by the Israeli military, which is carrying out genocide, with U.S. support, against the Palestinians and Lebanese. The record of crimes by U.S. imperialism goes on and on.

Through the fault of U.S. imperialist circles, mankind has been thrust into an unprecedented and highly dangerous arms race. The arsenals of the Pentagon are becoming increasingly filled with monstrous means of mass destruction -- nuclear, chemical, biological, and other types of weapons. In recent years the United States has established a mighty military industry. Today U.S. military business is concentrated in four principal industries -- aerospace, electronics, arms, and shipbuilding. They account for approximately 85 percent of all Pentagon procurement contracts. These industries are the principal base of operations of the military-industrial complex.

The Pentagon consumes the bulk of output of the aircraft industry, shipbuilding industry, and the electronics industry. Many other producing industries and service industries work for the U.S. military. A total of 25,000 U.S. contractors produce goods for the military -- from military footwear to ballistic missiles.

In order to justify the arms race from an economic point of view, the apologists of imperialism widely publicize the thesis that military expenditures allegedly stimulate economic growth and help to alleviate crisis phenomena. In actuality, however, as is attested by numerous data, military production has become a constant and heavy ballast weighing on the economy. It is a parasitical appendage of the economy, depletes the domestic resources of nations which have taken the road of militarism, and narrows their possibilities for further economic growth and development. Military production adds nothing to a country's economic potential; it is removed from the domain of societal reproduction. In the final analysis expenditures on military production are one of the major causes of growth in the economic ills of capitalist countries: inflation, aggravation of conflicts and disproportions in the economy, and unemployment.

Militarist preparations divert enormous labor resources away from productive activity. For example, according to figures in the foreign press, approximately 70,000 persons are employed in the manufacture of a single modern U.S. fighter aircraft. Supporters of the arms race try to argue that it allegedly helps solve unemployment. In actual fact, however, militarism directly and indirectly fosters the growth of massive unemployment. While enriching certain groups within the monopoly bourgeoisie, it leads to impoverishment of the peoples of the capitalist countries, which are languishing under the burden of taxes and growing inflation. The arms race and the bourgeois system of financing military preparations are intensifying exploitation of the toiler masses and are promoting redistribution of national income to the benefit of the propertied class. Growing military expenditures are being paid for chiefly through taxes, which contribute approximately 90 percent of all U.S. budget revenues. The arms race per se, even if we ignore the question of the direct danger of a nuclear catastrophe, is a useless waste of man's material and intellectual wealth, which mankind needs so desperately for the struggle against hunger, disease, and illiteracy, for resolving social, energy, raw materials resources, and economic problems.

To whom is an unchecked arms race advantageous? Primarily to U.S. ruling circles, which themselves consist to a considerable degree of millionaire representatives of the military-industrial complex. Here are just a few figures about the current Washington Administration. U.S. President R. Reagan is worth many millions of dollars. Secretary of Defense C. Weinberger, a former director of the Bechtel Corporation, which built a 1,000-kilometer oil pipeline in Saudi Arabia as well as many other strategic installations, possesses capital worth several million dollars. The secretary of the treasury is equally affluent. The attorney general owns shares in 21 different companies. These gentlemen were put into office by persons with even greater capital -- hundreds of millions and billions of dollars. Naturally the members of the present U.S. Administration steer the ship of state on a course which promises a steady growth in the income of the bosses of big business.

Aggressive militarist circles, seeking to justify a course of policy aimed at escalating the arms race, with simultaneous domestic "belt tightening," resort again and again to the lie of a "growing Soviet military threat," alleged U.S. falling behind in a military respect, as well as to expatiation about the need to secure U.S. "vital interests" in various parts of the world which are ric. in oil and other raw materials.

In view of all these facts the Communist Party of the Soviet Union resolutely opposes imperialism's course of policy directed toward aggravating the international situation and the arms race. Our policy position calls for guaranteeing the security of all peoples. Proceeding from this position, such documents have been drawn up as the Soviet Peace Program for the 1980's, many Soviet peace initiatives, and the Political Declaration of the Wardaw Pact member nations, adopted by the nations of the socialist community in Prague in January of this year. Even inveterate disinformation specialists in the West can find no "arguments" to play down the enormous significance of these peace proposals.

Soviet foreign policy strategy is unreservedly directed toward preserving peace and preventing war. However, while unswervingly implementing a vigorous peace-seek foreign policy, the CPSU and the Soviet State never lose sight of the presently existing military threat and are taking all necessary measures to guarantee their security. "Policy grounded on the endeavor to achieve military superiority over the Soviet Union," noted CPSU Central Committee General Secretary Comrade Yu. V. Andropov in his speech entitled "60th Anniversary of the USSR," "is hopeless and can only intensify the threat of war."

The power of the Soviet Armed Forces is a reliable guarantee of the continued success of Soviet foreign policy. In view of the present complex international situation, it behooves Soviet servicemen, including the airborne defenders of the homeland, to increase their vigilance against the intrigues by imperialist reactionary forces and to increase their combat readiness for armed defense of the achievements of socialism.

3024
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MEETING WAR VETERANS INSPIRES TODAY'S SERVICEMEN

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 83 (signed to press 2 Jun 83) pp 14-15

[Article, published under the heading "From Party-Political Work Experience," by Maj A. Drozdov: "Using Actual Combat Examples"]

[Text] During preparations for flight operations, flight leader military pilot 1st class Capt D. Piyanzin noticed that his subordinate officers, V. Pinzhenin and V. Livenskiy, were particularly diligently studying the training missions. The other young aviation personnel were also working much more diligently that day. Their replies during the readiness check were fuller and more detailed than in the past.

Sometimes an event, an encounter or discussion with others compels a person thoroughly to reevaluate his attitude toward his job and to engage in a more vigorous search for ways to overcome obstacles, in order subsequently to achieve a difficult performance level with greater confidence. Such was the case on this occasion as well. On the previous day squadron party and Komsomol activists, headed by unit party committee member Maj V. Plugin, organized a get-together with veterans of the Great Patriotic War, former pilots Heroes of the Soviet Union S. Karnach and B. Kovzan. The veterans became acquainted with the men's daily life and activities, visited lecture halls and simulator classrooms, and talked with aviation personnel. They also discussed further building upon combat traditions. B. Kovzan's account of how he had performed the first midair ramming deeply impressed the air warriors.

The story goes as follows. Boris Ivanovich had run out of ammunition. An enemy pilot was attempting to break away from the red-starred fighter sitting on his tail. Evidently it came to him that the Soviet pilot had nothing to shoot with. He was executing abrupt maneuvers, throwing his aircraft from one wing to another. "What I must do is pull even with him and slow to the same speed," Kovzan thought to himself, "and then cut into his tail with my propeller. Otherwise the fascist will attack me...."

He closely watched every maneuver by the enemy. Finally the moment was right: the Hitlerite had put his aircraft onto the left wing. The Soviet fighter dove under his fuselage. The whole thing took only fractions of a second. A sharp impact and a cracking sound. Fragments of the fascist aircraft's tail

came hurtling past. Kovzan's aircraft was thrown sideways and began to vibrate hard. The pilot quickly pulled back on the throttle, and the shaking diminished. The fighter proceeded to descend and soon landed behind friendly lines.

Boris Ivanovich Kovzan flew more than 230 combat missions in the war, fought 127 aerial engagements, and downed 28 enemy aircraft.

The men also listened with great interest to S. Karnach. "Few of the pilots from my regiment are still alive," said Stepan Andreyevich. "I therefore consider it my duty to relate to young aviation personnel the exploits of the older-generation men of their regiment."

He recalled many fellow warriors who had fought the enemy with no regard for their own lives.

The indoctrinational role of combat traditions is great indeed. Men serving under famed combat banners not only remember those who fought for the happiness and freedom of the socialist homeland. They endeavor to build further upon their fame through their own military labor. The slogan "We shall continue and build upon the combat traditions!" has become a guide to action for the men of this regiment. In the flight operations conducted following the get-together with the war veterans, officer V. Pinzhenin, V. Livenskiy and other pilots equalled the performance of the more experienced air warriors in combat employment of a modern missile-armed aircraft. They endeavored to demonstrate to the war veterans that the equipment and weapons are in reliable hands. And they successfully accomplished their task, earning marks of excellent.

In the most recent training period the pilots of the regiment in which Lt Col V. Grigor'yev serves as deputy commander for political affairs have achieved new heights in combat performance improvement and have reaffirmed their right to initiate socialist competition among district aviation personnel. In this regiment training is organized in conformity with the call of the time and the demands of today's combat, without unnecessary relaxation of demands or simplifications. Commanders and political workers arm the air warriors with solid knowledge and form excellent moral-political and psychological qualities in them. Indoctrination of pilots in combat traditions greatly helps in this endeavor.

The exploits of combat veterans serve as a vivid example for today's generation of aviation personnel of devotion to the homeland and the cause which they serve. During the years of the Great Patriotic War many pilots of this unit were awarded the coveted title Hero of the Soviet Union. B. Okrestin, L. Beda, I. Vorob'yev, M. Gareyev, and others performed fighting exploits.

The regiment's history is rich with heroic examples. And commanders, political workers, party and Komsomol activists endeavor to make maximum use of these in indoctrination work with young aviation personnel. Each new man assigned to the unit visits the combat glory museum on his very first day. The museum displays -- photographs from battle front newspapers, excerpts from action reports and operation orders, and copies of the service records of Heroes of the Soviet

Union -- carry a heavy ideological-indoctrination charge. The exploits of men from the same regiment help servicemen develop excellent moral-political qualities and help them more clearly see a point of reference for advancing toward the heights of military expertise.

Regulations have been drawn up in the regiment on competition among Komsomol members for the privilege of flying a mission symbolically for Hero of the Soviet Union B. Okrestin. Its purpose is to indoctrinate members of Komsomol and young people in combat traditions and to induce aviation personnel to achieve high-quality mastery of modern equipment, to increase the level of combat readiness and to strengthen military discipline. All Komsomol-youth crews, as well as young Communists are taking part in the competition. The honor of flying the mission for Hero of the Soviet Union B. Okrestin is given to that pilot who leads in the month's socialist competition result totals. Competition winners have included officers N. Duben', V. Pinzhenin, V. Livenskiy, V. Yegorov, and others. Each of them, after entering the flight in B. Okrestin's symbolic pilot log, received the pennant instituted in honor of the Hero.

Get-togethers and talks with veterans and study of various documents dating from the Great Patriotic War teach aviation personnel not only courage and staunchness. The combat experience of the war veterans and their tactical innovations are of great value. For example, the pilots of the squadrons under the command of Lt Col V. Nikonov and Maj Yu. Tregubenkov derived a great deal of benefit from get-togethers with Heroes of the Soviet Union V. Molozev and A. Kolomoyets.

The following is a combat incident related by war veterans dealing with the combat activities of ground-attack aircraft in the war years during the liberation of Belorussia. Aircrews were assigned the mission of preventing enemy military trains from withdrawing westward and of halting their movement along the stretch between Orsha and Borisov. Several groups of ground-attack aircraft took off on this mission. Sr Lt B. Okrestin and his wingman were to find the lead trains of the Hitlerite forces and to stop them. Soon the pilots spotted several trains moving westward. Okrestin positioned his group and led it in an attack on the lead trains. Taking aim, he released bombs on the lead locomotive. The target was crippled by a direct hit. The rest was a matter of methodical delivery of ordnance. The ground-attack aircraft quickly finished off the halted train.

The second and third trains met a like fate. The pilots saw cars derailing, exploding, and burning. In the meantime Sr Lt L. Beda's group was successfully attacking the military train which was bringing up the rear.

The flight led by Sr Lt N. Semeyko proceeded differently. The pilots attempted to hit the rail consist in such a manner that the cars would not derail but would remain on the tracks, thus blocking passage of other trains. To achieve this objective, Semeyko chose the most suitable point for the attack -- a stretch of rail line running along a deep, gently-sloping ravine. The aircraft headed right for the train at treetop level, dropping bombs onto the rails several meters ahead of the locomotive. The cars proceeded to jam up onto one another. Such a pileup of cars was formed that the Hitlerites were virtually unable to clear the line.

This is how the combat veterans had fought. On the eve of a tactical flight exercise the pilots of Lt Col V. Nikonov's squadron carefully studied their experience. Military pilot 1st class Sr Lt V. Konchakov analyzed the tactics employed by Hero of the Soviet Union V. Molozev in an enemy antiaircraft defense zone. Preparing to attack a small ground target, he decided to utilize a technique from the war -- crossing the battle line at treetop level, varying his heading and throttle setting. He added the necessary adjustments for the speed and electronic gear of a modern fighter-bomber. The maneuver proved successful in the mock engagement.

At the tactical flight exercise the squadron under the command of Maj Yu. Tregubenkov was assigned the mission of supporting a motorized rifle subunit in an attack. A thick haze covered the targets to be struck. But the air warriors entered the combat area skillfully, at extremely low level, quickly spotted the targets and attacked them. The pilots were helped by the combat experience of twice Hero of the Soviet Union L. Beda. He also had entered the battle area in bad weather conditions, at treetop level, spotted concealed and camouflaged targets on the basis of characteristic indications, and destroyed them from a shallow attack dive.

Considerable attention in this unit is devoted to study and practical application of wartime experience in party-political work. There is a great deal in common in the political development of wartime youth and the young people of today. During the war years, for example, following intensive air combat, pilots would visit the ground soldiers in their tents and dugouts and relate to them the exploits of Soviet citizens on the battle front and on the home front, as well as the political situation. Today as well talks right at the airfield about our homeland's heroic past and discussions of the grandiose plans for building communism in our country and the successes achieved by the peoples of the socialist nations remain for a long time in the men's memory and inspire them in their military labor. At the tactical flight exercise, for example, party activists Sr Lts S. Krylov and G. Kurzenkov set up at a field airstrip a display of materials dealing with the war exploits of the men of that regiment. When not engaged in flight operations, they would get together with the enlisted personnel and warrant officers providing the ground support, would share their impressions on their activities on the "battlefield," and would conduct political information briefing sessions, during which they would expose the aggressiveness of imperialism and call for vigilance and increased combat readiness.

Combat traditions from the war.... They have become a solid component of today's winged defenders of the homeland, those who are carrying on the combat glory of their fathers and grandfathers. The experience of the Great Patriotic War offers a source of instilling in aviation personnel the excellent political, moral-psychological and fighting qualities which are essential in today's combat.

3024
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PILOT LANDS SAFELY FOLLOWING BIRD STRIKE ENGINE-OUT

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 83 (signed to press 2 Jun 83) p 20

[Article, published under the heading "Marching in the Vanguard," by Lt Col A. Finayev: "Self-Mastery and Tenacity"]

[Text] Darkness had fallen over the airfield. The starry sky seemed to merge with the runway and taxiway lights. Capt Yu. Listurov was sitting in the cockpit of his missile-firing aircraft waiting for clearance to take off. He was in a good mood. He was looking forward to the cross-country training flight. He had flown similar training missions in the past, but he thought through the flight by deep-rooted habit. He never divided tasks into easy and hard ones. He always conscientiously prepared in advance for a flight: he would study the flight operations area, carefully calculate his route, and put in a good deal of hard work on the simulator. Today as well Yuriy Nikolayevich was sure that he would earn a high mark.

Having completed a precision job of flying his route, the pilot requested clearance to land. The outer marker audio signal sounded. The fighter was approaching the middle marker. Suddenly Captain Listurov felt a sharp blow, followed by the typical sound of an engine going out. He immediately realized what had happened, and he tried to remain calm as he informed the tower: "Engine out over middle marker."

The flight operations officer, Lt Col A. Plotnikov, was an experienced pilot. Although the radio message took him by surprise, he instantly assessed the situation and realized that it might be impossible to save the aircraft.

"Eject!" he ordered.

The pilot was faced with a difficult choice -- to abandon the aircraft or to ride it in to avoid destroying it.

...Not everybody knows right away what they want to do with their life. But Yuriy Listurov had no doubts whatsoever. His only desire was to be a pilot, and a fighter pilot at that! His father, Nikolay Petrovich, a military pilot, was a role model for him. Yuriy learned aviation terminology along with the multiplication table. Listurov Senior was flying MiGs, and his son resolved to

carry on the family tradition. He enrolled in higher military aviation pilot school. His instructor, Pilot 1st Class Ivan Aleksandrovich Lichenko, who was totally dedicated to aviation, patiently and persistently taught young men to fly, taught them a love for the sky, for aircraft, and their profession, and taught them good citizenship and patriotism.

"Presence of mind and self-control, as well as the ability to see the main point are important for the air warrior," Lichenko would often repeat.

Cadet Listurov received confirmation of the correctness of this statement every time he went up. His first solo flight was right on the money, as they say. He received the highest mark. Congratulating his pupil, his instructor said: "You have a good handle on it: you'll make a pilot alright."

Everything did not proceed smoothly, however. He had to work hard. Persistent practice sessions on the simulator and in the cockpit, and detailed analyses of errors helped him more thoroughly understand the sequence of distribution and switching of attention, manipulation of the controls, and helped him master the finer points of flying.

Recently Captain Listurov met his former instructor. Ivan Aleksandrovich was pleased with his performance. Listurov's aircrew is excellent; Yuriy Nikolayevich uses in his instructing many of the methodological teaching devices which Lichenko had employed. This is the highest reward for a teacher.

Upon graduation Yuriy wanted to be assigned to a line unit, where pilots were mastering combat flying, but they assigned him to the school as an instructor. This work involves different tasks and other specific features. One must be an expert pilot, a skilled methods specialist, an educator, and a psychologist. It is easier to learn than to teach others.

His experience grew with time, and he gained increasing pride in his work. Listurov taught 12 cadets how to fly, and all of them left a mark in his memory. They differed in personality and in attitude toward the task at hand. The instructor found the right approach to each, and to each he gave a part of his own soul.

One of them was Sr Sgt Oleg Martyuk, a Lenin Komsomol stipend recipient. A cheerful, capable young man, but a bit touchy and prideful. The instructor cautiously endeavored to help him eliminate negative character traits and gave him difficult assignments. The cadet handled the assignments well and helped his comrades.

Pavel Morozov also made a good impression. This cadet did an excellent job of learning to fly, and did a flawless job. He was an outstanding athlete, a member of the school's track team.

Sociable by nature, Yuriy Nikolayevich easily makes friends with people. Evidently this quality was taken into consideration when they made him an instructor. One can state with confidence that there is a good reason why officer Listurov is assigned to this job. He loves what he is doing, and is constantly improving his flying and methods skills. He is also active in sports -- he is second category in sport flying and shooting.

The aircraft continued the approach, perfectly aligned with the runway. Speed and altitude were dropping off rapidly. The pilot was trying to save the aircraft. The main thing now was composure and self-control. He mobilized all his will, experience and skill. He could not even consider the possibility of not reaching the runway. If only he could make it past the plowed field.

The ground was rushing toward him. Captain Listurov began smoothly pulling back on the controls.

The aircraft shook: apparently one gear had struck a ditch. But the aircraft continued rolling under control. When the aircraft stopped, the pilot pushed back the canopy and looked around. People were running toward him, and an ambulance and fire truck were speeding to the scene. A strong feeling of fatigue suddenly hit Yuriy Nikolayevich.

It was later determined that as the aircraft was approaching the middle marker the fighter struck a bird, putting the engine out. Captain Listurov passed with honor the ordeal to which he had been subjected. The commander of the air forces of the North Caucasus Military District presented this valiant pilot with a watch bearing the following inscription: "To Captain Listurov, Yuriy Nikolayevich, for Bravery."

3024
CSO: 9144/0343

ENGINEERS URGE UNIFORM AIRCRAFT EQUIPMENT TERMINOLOGY

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 83 (signed to press 2 Jun 83) p 21

[Article, published under the heading "The Reader Continues the Conversation," by engineers V. Suchkov, B. Kravchuk, and V. Zaytsev: "Price of Terminology"]

[Text] There is no doubt about the importance of the discussion begun on the pages of this journal with the article by Lt Col V. Kroshka entitled "Is Reserve Potential Exhausted?" (AVIATSIYA I KOSMONAVTIKA, No 2, 1983). Even what at first glance seemed to be insignificant, trivial items can play an important role in economizing in resources.

For example, what elements are included in the term "aircraft on-board equipment" [bortovoye oborudovaniye letatel'nogo apparata]? This would not seem to be a very important question, but inaccuracy in definition and different ideas by specialists about what it means makes communication more difficult, and many questions and need for explanation arise in using the term in documentation, a fact which results in wasting considerable time. In the final analysis this increases the labor input of work performed and increases additional expenditures of resources. Is this advantageous? Of course not.

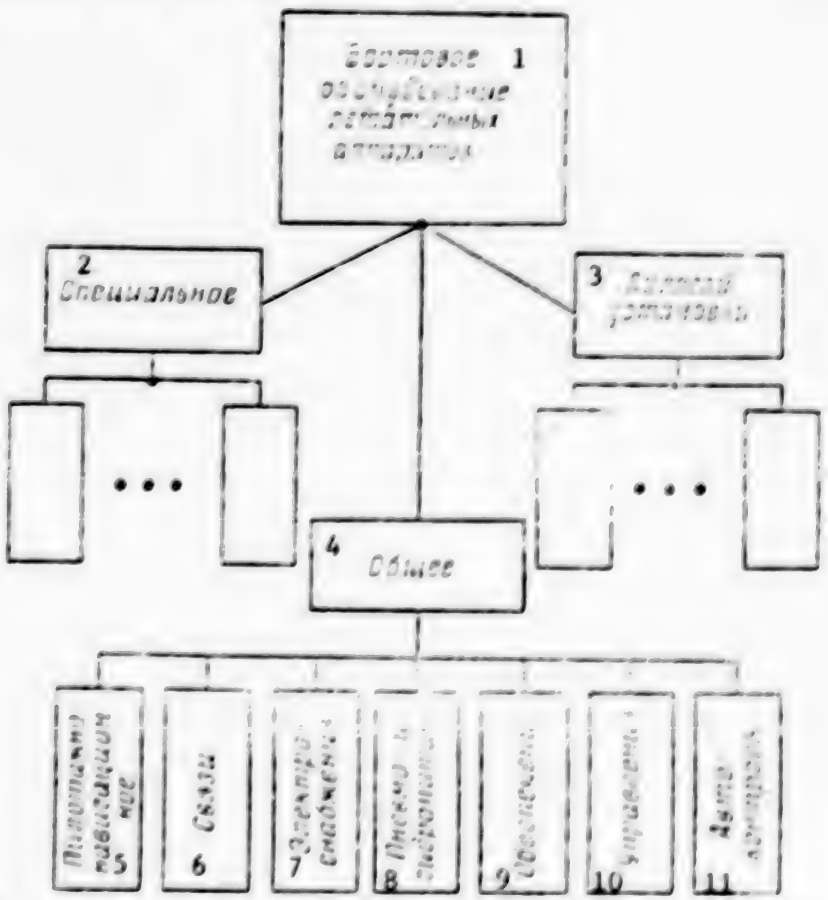
A precise definition of the term "bortovoye oborudovaniye letatel'nogo apparata" (BOLA) and the full extent of its encompassment is particularly essential in connection with a systems approach to planning and analysis of efficiency of employment of fixed-wing and rotary-wing aircraft. This term often appears in the technical literature and standard documentation, and it is employed by ground maintenance specialists. It has not yet been precisely defined, however.

Some people narrowly define this term to mean, for example, only avionics. Others define it more broadly, to cover all unit items: landing gear wheels, auxiliary power unit, etc. Still others exclude from the general definition of BOLA hydraulic and pneumatic equipment, as well as aircraft final control devices; equipment determined by function (for example, passenger use). And yet any imprecision in the meaning of the term creates uncertainty in transmission of information and analysis of a complete outfit, component element, as well as aircraft specifications and performance characteristics, which hinders coordinated work by maintenance personnel, their teamwork and mutual understanding.

To date the technical literature and documentation contain about 10 or so terms which are synonyms for the term bortovoye oborudovaniye letatel'nogo apparata -- "oborudovaniye" [equipment], "samoletnoye oborudovaniye" [aircraft equipment], "aviatsionnoye oborudovaniye" [aviation equipment], "oborudovaniye i sistemy samoleta" [aircraft equipment and systems], "sistemy (bortovyye sistemy), pribory i avtomaty samoleta" [aircraft systems (airborne systems), instruments and automatic devices], and "aviatsionnoye i radioelektronnoye oborudovaniye" [aviation and radioelectronic equipment]. Or take another example. An air-conditioning system is sometimes called high-altitude equipment, equipment for creating normal working conditions in flight, life-support system, cabin air temperature control system, means of ensuring safety and protection of the human organism, and pressurized cabin equipment.

Similar examples can be cited for virtually all types of equipment. Use of synonyms in different contexts sometimes creates the impression that different types of equipment are meant, since the textual material is of an indefinite nature. For many authors the term BOLA encompasses different comparative extents of coverage, and there is also no unambiguous terminology for the various types of airborne equipment. From this one can conclude that there has arisen an acute need for devising a uniform definition of BOLA and the types of equipment it encompasses. There exist certain premises. In particular, in spite of certain disagreements, virtually all authors note the principal equipment groups encompassed by BOLA: specialized (specific purpose), determined by the aircraft's specific functions; general equipment, characteristic of an aircraft of any type; equipment associated with the powerplant.

Classification of Airborne Equipment



(See key on following page)

Key to Diagram on preceding page:

1. Aircraft airborne equipment
2. Specialized
3. Powerplant
4. General
5. Instrument group, navigational
6. Communications
7. Electric power
8. Pneumatic and hydraulic systems
9. Support
10. Control
11. Automatic control and monitoring

It is important to remember that any term is an element of a classification constructed on the basis of logical division of a broad generic terminological concept into specific, type classifications. The term "aircraft airborne equipment," for example, is an element of the generic term "equipment." Dividing the term "equipment" on the basis of function and association, we can delineate it into specific terms. As a result we shall conclude that aircraft airborne equipment can be defined as the aggregate of mechanisms, machines, devices, and instruments installed on board and essential for performing the common tasks characteristic of all aircraft and the specialized (specific) tasks defined by the specific function of the aircraft, as well as tasks connected with powerplant operation and control.

In view of the fact that the term being discussed is employed by specialists in various branches and sectors of the economy, we feel that it is essential, in order to provide it with a uniform definition, to devise a definition for BOLA and to classify it within a GOST [State Standard]. A standard, scientifically validated terminological classification will improve the quality of technical documentation, will reduce the ambiguity of its interpretation, and will improve mutual understanding among specialists, which unquestionably will help improve the economic effectiveness of aircraft.

3024
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DANGEROUS AIRFLOW SEPARATION AT HIGH ANGLES OF ATTACK DESCRIBED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 83 (signed to press 2 Jun 83) pp 26-27

[Article, published under the heading "To the Pilot on Practical Aerodynamics," by Candidate of Technical Sciences and Docent Engr-Col V. Silkov, Engr-Maj O. Lenko, and Sr Lt Tech Serv V. Shepel': "The Aileron at High Angles of Attack"]

[Text] Excellent aircraft handling characteristics are determined in large measure by its controllability characteristics. Rapid change in bank angles provides capability precisely to maintain flight path trajectory, to execute vigorous maneuver, and improves safety, especially at high angles of attack and close to the ground. Pilots know full well that ineffective control on the roll axis delays aircraft recovery from a bank, which can lead to a dangerous loss of altitude.

Maximum allowable angles of attack are restricted on certain aircraft because of poor lateral controllability. Restrictions on maximum allowable crosswind component during takeoff and landing are in most cases imposed for this same reason.

Deterioration of the performance of roll-axis controls at high angles of attack is connected with the specific features of airflow. We shall examine these features on the example of airflow across an aircraft wing model in a hydrodynamic tube (GDT). GDT are employed to study flow of an incompressible fluid across various bodies. Water is used as the medium. To observe the nature of flow, holes are drilled into the surface of the model and a fluid dye is placed in the holes. Releasing the dye into the stream of water, one can trace the paths of the fluid particles and obtain an idea on the specific features of flow past an aircraft model of complex shape, which is virtually impossible to do with a wind tunnel or in actual flight.

We know from aerodynamics that the processes of flow are similar on a model and an actual aircraft if the Reynolds numbers are the same. The Reynolds number characterizes the viscosity of air and at high angles of attack substantially affects the nature of airflow. When it decreases, the thickness of the wing boundary layer increases, flow separation begins at smaller angles of attack, while maximum lift coefficient values decrease (Figure 1 on back cover) [not reproduced].

In a GDT flow rates are small, as are Reynolds numbers, and separation begins at angles 6-7° less than in actual flight. In all other respects the physical picture of flow past an aircraft in a GDT, as studies indicate, matches fairly well results obtained in a full-scale test. The illustrations (see back cover) [not reproduced] show angle of attack values on a model wing in a GDT. The wing has a leading-edge sweep of 30°. Photographs 1-5 show flow across the wing without slip with neutral aileron. As is evident, with a 2° angle of attack flow across the wing is without separation, and the flow lines "adhere" to the wing surface, as it were, and are directed along the main (undisturbed) flow. When the angle is increased to 4°, flow along the wing span begins to develop in the vicinity of the trailing edge. This is caused by boundary layer flowoff toward the wing tip sections under the influence of the velocity vector component running parallel to the leading edge (photograph and Figure 2).

With a further increase in α, the boundary layer flowover effect intensifies, and boundary layer thickness increases. The velocity of particles of fluid begins to diminish close to the wing surface, that is, the boundary layer strongly counteracts the main flow, and its deceleration causes pressure in it to increase. Since pressure is less in the forward part of the wing section as a result of greater rarefaction, particles of fluid in the boundary layer begin to move forward (position III in Figure 3) -- local zones form, in which complex vortical motion takes place. Local vortices forming in any wing section are carried to the wingtip. As is evident in photographs 2 and 3, the flow lines on the rear slope of the wing section separate from the wing surface and turn into the direction of span -- flow separation begins. But this has virtually no effect on lift, and the pilot notices no changes in control.

When the angle of attack is increased to 8° (Photograph 4), intensity of vortex motion increases, and its zone of effect expands. So-called "separated flow bubbles" form due to the circulatory motion of the fluid. The departure of each bubble from the wing surface is accompanied by an abrupt change in pressure, which is transmitted to the wing skin. This is perceived by the pilot as shaking of the airframe. On many aircraft shaking is a dependable indication warning the pilot against further increasing the angle of attack.

So-called rocking from wing to wing frequently occurs when the separation region is enlarged. The formation of vortex sheet on the wing skin is clearly evident in photographs 3 and 4. Leaving the wing, it curls into a cylindrical vortex and remains behind the aircraft as a turbulent wake. When α=8°, the vortex on the forward edge of the aileron begins to break up. With a further increase in angle of attack, the separation region extends forward along the wing section and toward the wing root. As is evident in Photograph 5, when α=12°, separation encompasses the entire surface. Wing lift sharply diminishes, and the aircraft stalls. The sheet, torn from the surface, is unable to curl into wingtip vortices as was the case when α=6°.

In order to gain a more complete picture of the conditions in which an aileron operates, let us examine how aircraft slipping affects flow across the wing (photographs 6 and 7) when α=10°, when the wing is slipping at angles of -10° and +10°. Photograph 6 shows a trailing wing. Its effective sweep and

velocity component $V_{\parallel}$ have increased. Flow toward the wingtips has become clearly-marked, and a zone of strong vortex motion has formed above the wing surface in the area where the aileron is located. Aileron operating conditions have deteriorated substantially.

If the wing is advanced during a slip (Photograph 7), its effective sweep will decrease. When $\beta = +10°$, one observes a flow movement from tip toward wing root, the intensity of vortex motion weakens, and conditions of flow over the aileron become more favorable. They are also retained at high angles of attack (photographs 8 and 9). Increasing effective sweep while simultaneously increasing angle of attack provokes more severe separation (Photograph 10).

We shall now examine flow across the wing when the ailerons are deflected. Photograph 11 shows flow configuration when $\alpha = 6°$ with aileron deflected upward 10°. The aileron has caused slight disturbance on the forward surface of the wing and has generated two clearly-marked vortices on the aileron ends and a wake forming as a consequence of flow separation from the aileron's sharp trailing edge. Flow remained unseparated along the entire wing surface and on the aileron, which indicates a high degree of aileron efficiency, which is quantitatively estimated by the coefficient $m_x^{\delta_э}$. It shows the amount by which the aircraft's rolling moment coefficient changes with a 1° aileron deflection. This coefficient remains virtually constant up to separation angles of attack (α_{cp} in Figure 4).

The flow picture changes significantly with a downward aileron deflection (Photograph 12). Since section curvature increases, the fluid cannot abruptly change its trajectory of motion, due to viscosity and inertia, and separates (Figure 3). Virtually the entire "back" of the aileron is in a separation region, and with an increased angle of attack aileron effectiveness begins to diminish. As is evident from Figure 4, when

$$\alpha > \alpha_{cp} \text{ coefficient } m_x^{\delta_э}$$

begins to decrease. When actually flying under such conditions, an aircraft responds sluggishly to lateral deflections of the controls, and an inexperienced pilot could take this to mean failure of the lateral control system. In order to determine that this is not the case, it suffices to reduce the angle of attack and then test the aircraft's response to a lateral deflection of the controls.

The vortex motion of flow in the region of the aileron can be traced in photographs 13-15. It becomes more intense with increased angle of attack and slipping on the trailing wing. Flow separation may diminish and even cease entirely on the trailing wing during slipping, with upward aileron deflection (Photograph 16). As we know, aircraft slipping and banking is a cause-and-effect relationship. If the pilot deflects the controls in a direction opposite to the bank, dangerous flow separation may occur on the wing, causing the aircraft to stall. For this reason procedures prohibit a pilot from countering a bank with his ailerons at excessive angles of attack. It is recommended that the angle of attack be reduced before pulling out of a bank, in order to obtain smooth flow before terminating the bank. Photograph 15 is highly instructive

in this regard. It illustrates the nature of flow across a dipping wing when the pilot deflects the controls opposite the bank and intensifies separation.

Modern swept-wing aircraft have large maximum angles of attack, which significantly exceed those discussed in this article. However, the graphic description of the processes which take place during flow across a model wing in a GDT will unquestionably help pilots gain a clearer picture of the physical essence of the phenomena which take place on a wing at high angles of attack during actual flight conditions.

3024
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STUDENT PILOTS USE SIMULATOR TO LEARN SPATIAL ORIENTATION

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 83 (signed to press 2 Jun 83) pp 28-29

[Article, published under the heading "Constant Attention to Flight Safety," by Honored Military Pilot USSR Lt Gen Avn N. Kryukov and Candidate of Psychological Sciences and Docent Engr-Col M. Kremen': "By a Method of Reference Points"; second of two parts, continued from No 6, 1983]

[Text] A flight experiment using the L-29 trainer was conducted in the squadron which at the time was under the command of Lt Col A. Plotnikov. Participants in the experiment included 18 second-year cadets and 6 pilot-instructors: Maj O. Kirsanov and Capts S. Beketov, A. Borisov, S. Il'in, A. Sinel'nikov, and S. Smirnov. The instructors were selected so as to have equal flying skills and approximately equal teaching experience and reputation at the school. It was required that teaching personnel fully understand the purpose of the experiment and that they take part in analyzing the results of ground training, in order to determine gaps and omissions in the training of each individual, in order to concentrate attention precisely on these gaps during initial flight instruction.

Methods classes were held with the pilot-instructors, at which they thoroughly studied the component constituents of obraz poleta [representation of flight, spatial orientation], the system of flying maneuver reference points, and the sequence of distribution of attention in teaching the cadets. Nor did they forget about safety procedures. They explained that the pilot-instructor was to focus the student pilots' attention on the aircraft's spatial position at the points of reference and was to teach them to distribute their attention efficiently, for the purpose of optimal collection of instrument and noninstrument information.

Lt Col A. Plotnikov designed a rudimentary simulator. They built it with their own resources and manpower. The simulator consists of a screen, aircraft and engine controls, and a seat (Photograph 1) [not reproduced]. A projector (Svityaz', Proton) projects onto the screen a slide of an instrument panel with a projection of the horizon line onto the aircraft cockpit and instrument readings corresponding to a specific reference point. Maj Tech Serv Yu. Pashichev designed and built a simple simulator model showing the aircraft's spatial attitude (Photograph 2) [not reproduced]. Utilizing it, the student

pilot indicates the aircraft attitude corresponding to the information obtained from the slide. Several other technical devices were also designed and built, enabling personnel to solve assigned problems with what we feel is the least expenditure of time, energy, and resources.

In order more fully to develop spatial orientation during ground and preflight training, we extensively ran the training films "Landing the L-29 Trainer," "Preventing Piloting Errors in the Performance of Complex Maneuvers on the MiG-21 Aircraft," and others.

Flying group facilities made it necessary substantially to revise organization of checking preparedness to take to the air and testing of the student pilots' knowledge. Pilot-instructors Captains Beketov, Borisov, and Il'in began more extensively adopting intensive teaching methods: "walking through the maneuver," questioning, work at the blackboard, on the simulator with slides, and quizzes. All student pilots in the flying group took part at the same time; they were given scenario instructions, test questions, and problems. Not more than 5 minutes was allocated for answering, practicing, and solution. The instructor gave each student pilot from 6 to 8 problems to solve in order to be fully assured that the student was prepared and was thoroughly familiar with the reference points, manipulation of the cockpit controls, as well as to evaluate the student's spatial orientation.

In the process of examining an informational description of the reference points, the instructors made sure that they also focused attention on anticipated typical noninstrument information during flight which in practice is very difficult to depict and reproduce on the ground (in simulators, during classroom sessions).

At the initial phase of teaching with this experimental method, adoption of this new innovation involved certain difficulties. They lacked special teaching aids. Deep-rooted forms of readying students to fly exerted a negative influence. There were no concrete, convincing results, due to incomplete processing of the obtained materials. In the squadron of Lt Col V. Blagodatskikh, for example, almost 40 percent of the pilot-instructors, in spite of the fact that they had attended classes dealing with the proposed teaching method, were continuing to teach in the old way and were not using technical devices.

Proceeding from this, and aware of the importance of continuing the quest for results, the authorities decided to discuss these important matters at methods councils. They held a school methods conference, and subsequently organized additional classes in the squadrons and in the flight training department. Party and Komsomol meetings were held in the subunits. These measures made it possible to correct the situation.

Prior to conducting the MiG-21 experiment, flight personnel and cadets at all levels were briefed on teaching results based on developing spatial orientation on the L-29 trainer, and they were shown a film taken during the experiment. The process of reequipping training facilities continued, and new visual aids were being prepared.

The MiG-21 experiment ran 2 years. This time the framework of the experiment was somewhat expanded. Participants included cadets who had already been taught on the reference point method on the L-29 and were just commencing such training on the combat fighter. The flights were led by Majs P. Kolpakov and Ye. Polstyanko. The performance results of the experimental group were compared with the performance data on the control group cadets, who were trained in Maj Yu. Fomin's flight.

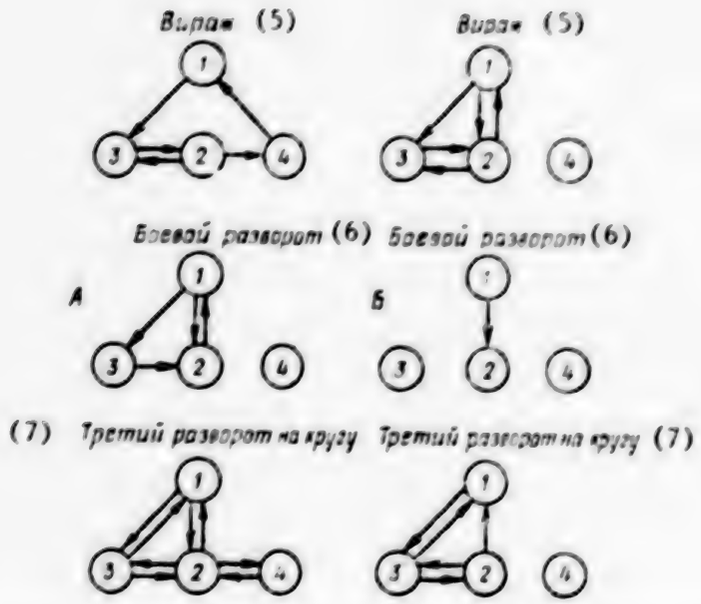
At first the existing teaching methods were supplemented by exercises which helped cadets assimilate the reference points and learn correct attention distribution. We considered that the objective of this phase was to teach the cadets to convert the received information into a graphic picture of the aircraft's spatial orientation. After this, in the second phase, reference points were used as a means of organizing the attention of the future combat pilot, helping optimally combine instrument and noninstrument data to achieve high-quality piloting.

We feel that the results of the three-year flight experiment confirm the advisability of incorporating teaching which utilizes new methods devices. Consider just the following facts. The degree of monitoring of the space outside the cockpit by the pilots and cadets in the experimental group is considerably greater than that of the control group (see table). The student pilots in the experimental group also learned to acquire information based on noninstrument signals, and their field of perception of instrument information was much greater (see diagram). The quality of aircraft handling by the students in the experimental group was not below a mark of good according to current performance standards. The average number of dual-instruction flights prior to the first solo on the MiG-21 was less for the experimental group than the control group. This figure was typically 12-13 flights (total time reduced by 2 hours and 45 minutes) for student pilots A. Yermakov, N. Kabylbekov, N. Medyashov, and others who were taught by the reference point method on the L-29 trainer, while the figure was only 7-8 flights (total time reduced by 1 hour 31 minutes) for students A. Abel'piisov, A. Denisov, Yu. Kalinkin and their comrades who commenced studying by the reference point method only on the MiG-21. Consequently the greatest savings and the least expenditure of manpower are achieved with an earlier commencement of teaching based on spatial orientation.

Mathematical Expectation of Time Spent on Monitoring Space Outside Cockpit (as Percentages) on the L-29 Trainer

Maneuver	Group of Students		Group of Pilots	
	Experiment	Control	Experiment	Control
360° banked turn	86	28	93	38
Chandelle	79	29	92	40
Turn onto base leg	83	41	90	52

Although the emphasis of the reference point method is on visual flying, flight experiment persuasively demonstrated that the quality of instrument flying also improves considerably due to optimization of the structure of information collection. For example, the average time expended on determination and recovery of an aircraft from a complex spatial attitude by instruments was 8.5 seconds



Sequences of eye movement across instrument panel in executing maneuvers and turning onto base leg: A -- experimental group students; B -- control group students.

Key:

1. Space out of cockpit
2. Center of instrument panel
3. Left part of instrument panel
4. Right part of instrument panel
5. 360° banked turn
6. Chandelle
7. Turn onto base leg

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less for the experimental group than for the control group. And the average amount of error in maintaining the basic parameters of a 360° sustained turn with a 60° bank under the IFR hood was 14 percent less with the experimental group than with the control group.

The students in the experimental group were asked in a questionnaire to state their feelings about the teaching method employing reference points. The questionnaires were filled in anonymously in order to obtain franker statements. Here are some of the student pilots' opinions taken from the questionnaires: "My attention distribution improved, and I became more cautious"; "I became more confident, more relaxed, and attention distribution was freer"; "I got a better 'feeling of the aircraft,' I developed innovativeness in flight execution, and flying became more enjoyable"; "I became more aware of my piloting actions"; "My distribution of attention during flight improved, and my actions became more 'laconic'."

The principal advantage of this methodological teaching device consists in a directional thrust and organization of the student pilot's attention which optimize collection and processing of information and, as a result, make extra time available to monitor airspace, for conscious evaluation of spatial

attitude and overall current spatial orientation, that is, they facilitate the process of piloting and improve flight safety.

The experiment suggests a number of conclusions. The effectiveness of teaching with the method of reference points is due to the fact that in the learning process the student is guided into forming superior spatial orientation, containing such basic components as a "feeling of the aircraft" and an idea of the aircraft's spatial attitude. The future pilots gain more precise knowledge of all fundamental flight parameters and the sequence of attention distribution during execution of a flight maneuver. The students in the experimental group more extensively utilize noninstrument information (up to 80 percent of flying time), which unquestionably attests to their better preparedness in matters of circumspection, and helps increase the combat pilot's proficiency and flight safety. At the same time saturation of the content of spatial orientation, which controls a pilot's actions in VFR flying, with information on the nature of inner perceptions and the dynamics of external space ensure the development of superior spatial orientation during instrument flying as well, enriching a pilot's grasp of spatial attitude and developing a "feeling of the aircraft."

3024
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PROCEDURES FOR NIGHT HELICOPTER LANDING ON PITCHING DECK DESCRIBED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 83 (signed to press 2 Jun 83) pp 30-31

[Article, published under the heading "Flying and Psychology," by Honored Test Pilot USSR N. Bezdetnov: "Night Landing Onto a Rolling and Pitching Deck"]

[Text] The control, performance, and navigation instruments carried by a modern helicopter enable the pilot confidently to fly the helicopter and execute a landing in instrument weather, day or night, with low ceiling and visibility. As we know, however, the landing proper is executed visually, and the pilot's proficiency, experience and skill are manifested in full measure precisely during this most critical phase as during no other. As a rule during practice flying he commits to memory a certain projection of the runway or landing area with various approach configurations. This also helps him complete a flight sometimes in the most adverse conditions.

But what if this projection is constantly changing. Such as when landing onto the pitching and rolling deck of a ship, and at night to boot. What are the specific features involved and how will the pilot proceed? In this article we shall discuss only that which directly affects flight safety.

Flying above a water surface and landing onto the deck of a ship are unusual in the fact that the pilot must solve piloting problems in three coordinate systems. Gravitational force is oriented in a terrestrial coordinate system, and the aerodynamic forces, which counter it, are oriented in an air coordinate system, which the pilot can take into consideration comparatively easily in the air. But he must land the aircraft on a deck, that is, gain his bearings in the ship's coordinate system.

When the ship is not rolling or pitching and the resultant airstream flowing past the ship is figured by the aircrew as meteorological wind, calculation of the approach and the landing do not differ from normal airfield landings. But if the deck is rolling and pitching, the ship's coordinate system differs substantially from the terrestrial (gravitational). The pilot must simultaneously see both the helicopter's spatial attitude in the terrestrial system and its motions in the ship's system. This requires a clear-cut, well rehearsed configuration of distribution of attention or an instrument which combines the requisite current information in a single display channel. But in any case it

is necessary first of all to gain a thorough understanding of the physical processes which take place during such a landing and to learn to shift promptly from controlling the aircraft in one coordinate system to operating it in another, transitioning from one stage to the next on the final approach descent.

It has been noted that frequently even experienced pilots, upon visual contact with the ship, are premature in conforming their approach controlling actions to the ship's coordinate system and involuntarily maintain a glide path which is geometrically motionlessly oriented in relation to the ship. This inevitably leads to cyclic displacements of the helicopter in the terrestrial coordinate system at a frequency equal to the ship's natural oscillation frequency. At a fairly substantial distance from the point of landing, the pilot is unable fully to perceive changes in the glide path, and it seems to him that the pitching or rolling has diminished. This phenomenon is sometimes called pitching concealment. As the aircraft approaches the ship, the magnitude of linear glide path displacements diminishes, and now glidepath changes can be fully tracked (it seems to the pilot that the ship is ceasing to pitch). The danger is that the pictorial resultant line of the combined glide path displacement in the terrestrial system may come into contact with the water surface, and if the pilot, visually maintaining glide path, begins tracking its deviations (the illusion of pitch cessation), the helicopter may hit the water (Figure 1).

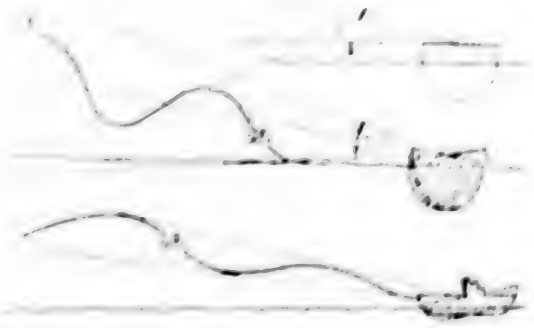

Figure 1.

In connection with this, in spite of good visibility at night, the pilot must continue flying on the gauges until he is not more than 100 meters from the ship. From this distance all of the ship's motions are clearly visible. The flight operations officer should inform the pilot on the magnitude of pitch or roll in advance.

A no less important element of piloting a helicopter is the pretouchdown hover above the pitching deck and the touchdown. When the deck is pitching and rolling, the point of touchdown on the deck in the terrestrial coordinate system is continuously displacing in the vertical and horizontal planes. Vertical displacements of the landing pad do not present any difficulties in the approach and landing calculation. Lateral displacements cause much more difficulty, as they force the pilot to operate the helicopter while simultaneously conforming both to the terrestrial and ship's coordinate systems. This operation is especially difficult at night, when the natural horizon cannot be seen. In hovering mode above the deck, if the pilot loses his picture of the pitching dynamics, he automatically conforms to the ship's coordinate system. In other words, it

begins to appear to him that the pitching has stopped, and as a result, when the ship heels 10°, for example, the helicopter will heel to an equal degree in the terrestrial system. Orienting himself by the deck, the pilot does not see this heel and, noting an unexpected sideways displacement of the landing pad, vigorously counters the deflection with the controls. This can lead to exceeding maximum booster response rate limits (it is necessary sharply to change the amount of heel by no less than 20°). The pilot cannot predict the moment of deck displacement, which means that the helocpter may touch down with displacement at a maximum ship heel angle.

There exists a method of combining helicopter control in the terrestrial and ship's systems. It consists in the following: the pilot, hovering, perceives and counters helicopter displacement relative to the point of touchdown -- namely the point, not the plane of the helicopter pad. Hovering above that point without large displacements ensures a normal spatial attitude in the terrestrial and ship's systems. Such a solution to the problem, which is simple at first glance, in actual fact is complicated by illusory (apparent) deck lateral displacements. In what does this phenomenon consist? Let us examine Figure 2.

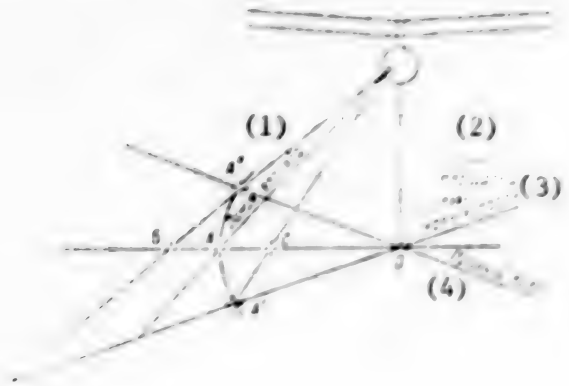

Figure 2.

Key:

1. Line of pilot's gaze
2. Center of helicopter pad
3. Ship heels left
4. Heels right

Positioning himself precisely above the touchdown point, the pilot notes regular deck lateral "displacements" and immediately responds to them with the controls, swinging the helicopter. In the process of hovering (higher than 1 or 2 meters), the helicopter swings over the center of the helicopter pad because, countering illusory displacements, the pilot fails to see actual displacements. With a vertical-descent approach, the apparent displacements diminish, and the true displacements appear. This forces the pilot to stop his descent, to gain altitude, and reinitiate the approach. What are the reasons for the occurrence of apparent deck displacement, and how can one solidly master methods of combating them? Let us take a look at Figure 3.

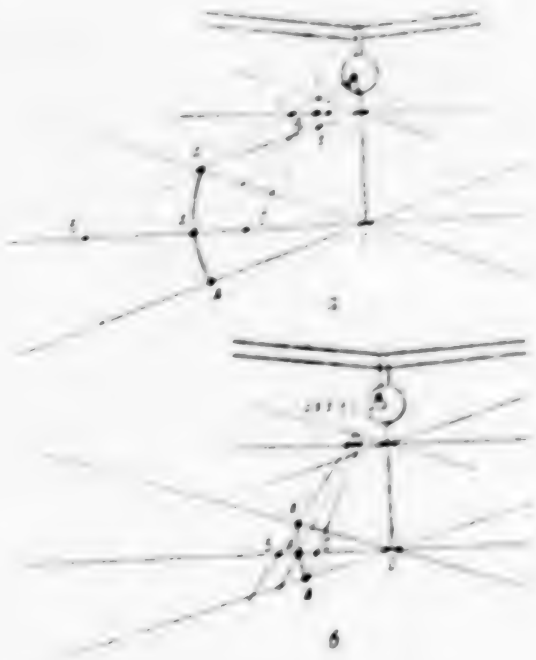

Figure 3.

Situation a graphically demonstrates decrease in the illusion of deck displacement from change in height of the pretouchdown hover, while situation b shows decrease in illusion from increasing the angle of inclination of the pilot's line of gaze. If we put these two variations together, the pilot will perceive only the actual geometric deck displacements in the terrestrial system -- comparatively small, slow, and easily countered. How can this be done?

Prior to flight operations under rolling and pitching deck conditions, the height of the pilot's seat must be adjusted. Seating him high in the cockpit makes it possible maximally to increase the angle of inclination of his line of gaze. The pretouchdown hover should be executed at a height of 30-40 cm, without worrying about one of the main gear wheels coming into contact with the deck with a maximum heel. Even if this occurs, the pilot must delay further descent to the point of touching the deck with the other wheel, after which the pilot smoothly lowers the collective pitch lever all the way.

This method of landing on a ship at night during pitching and rolling conditions ensures a reduction in deck displacements perceived illusorily. The pilot calmly operates the controls. The landing is accomplished without lateral displacements and excessive load factors.

We should note that when hovering at a height of more than 1 meter, as a rule illumination devices are required to provide information on ship pitching and rolling dynamics, phase and magnitude of heeling motions. The proposed method remains the principal method with any other means of assisting the pilot (including automatic), since it reveals the physical essence of the phenomenon.

3024
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IMPORTANCE OF HEEDING WEATHER DETERIORATION STRESSED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 83 (signed to press 2 Jun 83) pp 32-33

[Article, published under the heading "This Could Have Been Prevented," by tactical control officer 1st class Maj Yu. Andronov: "If Only the Weather Had Been Considered...."]

[Text] Flight operations would soon be commencing, but the weather was deteriorating. The duty weather forecaster was particularly concerned with the way the weather was developing to the south, toward the bay. The situation was complicated by the fact that they had rather meager information on hazardous weather in that area. Therefore the officer requested that the pilot of the weather reconnaissance aircraft, L. Col A. Tsesel'skiy, take a particularly close look in that area and make a detailed evaluation of the weather situation.

Officer Tsesel'skiy would be directing flight operations. Soon after taking off he spotted an area of low clouds and worsening visibility in the area pinpointed by the weather officer. This should have alerted him, an experienced pilot, and made him treat more seriously an analysis of weather conditions and endeavor more precisely to determine how the weather was apt to develop further. But the officer failed to attach adequate importance to this and failed to report his observations to the aircrews and weather specialist in the preflight briefing.

Later, during the critique following flight operations, which had to be suddenly cancelled while in progress, Tsesel'skiy stated that he had really wanted to carry out the scheduled flight operations. That was why he had proceeded. We shall state in due course the consequences of this decision. For the time being we shall comment that both the pilots and the duty weather officer were deceived. The latter found himself in a particularly difficult situation: not one of the weather subunits at the adjacent airfields noted that the weather was deteriorating. In other words conditions were present for a dangerous, accident - threatening situation, and these conditions subsequently became worse. Here is why.

Flight operations commenced. The flight operations officer received reports from the first aircrews up. Communicating with them by radio, Lieutenant Colonel Tsesel'skiy did not once inquire about weather conditions in the deteriorating-weather area. Some time later one pilot, and then another reported that the ceiling was dropping and visibility worsening. Following a brief consultation

with the weather specialist and after receiving pilot reports from the other aircraft, it was obvious that the pilots should return to the field as quickly as possible. Officer Tsesel'skiy proceeded to order this.

Here, according to the unanimous opinion of the people from higher headquarters who analyzed the incident, he made another serious error. The weather was still good at the neighboring airfield, but the flight operations officer sought to bring the pilots back to their home field. As a result some of them made their approach and landing below the designated minima. This could have ended in disaster.

All the factors involved in the dangerous, accident-threatening situation were later analyzed in detail. Lieutenant Colonel Tsesel'skiy was punished. He and the other officers involved in flight operations supervision and control were once again reminded on how they should perform their duties. Supplementary weather classes were held in the unit.

There is one important detail to this incident. After flight operations were suspended, Lieutenant Colonel Tsesel'skiy judged the flight operations forecast prepared by the weather specialists as unwarranted, and he severely reprimanded the duty weather officer. And yet, as we have seen, the accident-threatening situation was caused by other factors.

Today meteorological subunits are provided with sophisticated equipment which enables one rather accurately to predict the development of weather over a specified period of time. But it is impossible to assess the state of the weather and current weather change trends in a specific area, particularly an area at some distance from the airfield, with absolute certainty only from the ground. This is the reason for conducting weather reconnaissance prior to commencing flight operations and updating reconnaissance during their conduct. And the fact is that in order to ensure safety of flight operations from a weather standpoint, precision cooperation and exceptionally efficient coordination are needed between the flight operations control team, the crews in the air, and the weather forecasters.

The aviation unit in which the meteorological subunit was headed by officer A. Vas'kov had for several years running no near-accident situations caused by poor analysis or nonobjective weather forecasting. Flight training schedules were accomplished in their entirety year after year, although the weather situation in the area of this base was rather unfavorable on the whole.

What was the reason for such continuing success? In answering this question, I shall discuss only certain elements. The regimental authorities and Captain Vas'kov himself worked hard to ensure continuous upgrading of knowledge and skills particularly on the part of weather specialists, pilots, and tower operating personnel. Training classes and drills were held regularly and purposefully. As a result every appropriate individual was clearly aware of the physical characteristics and local conditions for the development of dangerous weather phenomena, and each individual knew his role in providing weather support for safe flight operations.

The weather forecast prepared for a flight operations shift would always be refined and further detailed in the process of full weather reconnaissance. And when flight operations commenced, the flight operations officer (no matter who performed these duties) would regularly question the best-trained crews on weather development in the area. It became a mandatory rule for all pilots to report the slightest weather deterioration. If necessary additional reconnaissance would be conducted immediately. The weather forecasters and the flight operations control team were greatly assisted by radar specialists, who continuously monitored areas where hazardous weather might develop.

Consideration of all requisite data and its detailed analysis by the duty weather officer and flight operations officer, and immediate mutual briefing always made it possible to take immediate and effective measures and to extricate themselves with honor from a deteriorating situation if such occurred.

...I feel that there is one additional detail in the incident involving officer A. Isesel'skiy which should not be ignored. As we know, weather data are gathered and analyzed not only for the requirements of one's own unit but are also transmitted to neighboring and higher-echelon weather service subunits. Obviously incomplete, perfunctory, and inaccurate data make their job much harder and greatly expand the range of error. As a result undesirable consequences can occur on a much more extensive scale.

Lack of coordination and genuine businesslike contact between weather stations negatively affects the accomplishment of any task, including meteorological support services for flight operations.

Complex weather and weather forecasting conditions occur virtually everywhere. But potentially hazardous situations for flight operations occur only where potential hazards are ignored. And this is understandable: even an excellently trained weather specialist will be virtually powerless if he does not receive sufficient information to detail and refine his forecast, if he is unable to find a common tongue with those who organize and direct flight operations.

3024
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OFFICER URGES INSPECTIONS TO CHECK AIRCRAFT MAINTENANCE ADEQUACY

Moscow AVIATSIYA I KOSMONAVTIKA in Russia No 7, Jul 83 (signed to press 2 Jun 83) pp 34-35

[Article, published under the heading "The Know-How of the Finest Into the Combat Arsenal," by Engr-Lt Col V. Begeka, regimental deputy commander for aviation engineer service: "Specific-Purpose Aircraft Inspection"]

[Text] Specific-purpose inspections play an important role in ensuring a high degree of effectiveness of aircraft preventive maintenance. As a rule these inspections are performed by unit engineers. They not only check out an aircraft's overall condition but also thoroughly inspect component units, systems, and mechanisms, and comprehensively analyze revealed deficiencies.

The unit deputy commander for aviation engineer service specifies the scope, sequence, and timetable for specific-purpose checks and inspections. He also arranges and schedules a briefing session for the engineers involved, realizing that the effectiveness of these measures depends to a large extent on the specialists' attitude toward the assigned task, their initiative, innovative approach, and firmness in evaluating the state of aircraft components and equipment.

The specific-purpose aircraft inspection is a serious examination not only for the specialists but also for those who perform the function of inspectors. They check not only an aircraft's systems, assemblies, and component units, but also the knowledge of aviation engineer service personnel, the skill and ability of engineer-supervisors to work on a high organizational and methodical level.

Coordinated efforts on the part of aviation engineer service supervisor personnel and a firm, demanding approach to evaluation of the state of combat equipment is an essential condition for high-quality conduct of the specific-purpose inspections and enhancement of its role in indoctrinating and mobilizing personnel to achieve additional successes in improving their professional skills. And on the other hand, if engineers perform a comprehensive inspection in a superficial manner and fail thoroughly to examine the operation of aircraft systems, assemblies, and component units or, what is even worse, sometimes rate performances excessively high, no benefit will be derived from such oversight activities.

I recall an incident in this connection. A team of officers led by Engr-Maj S. Mishin was inspecting the aircraft of Capt Tech Serv G. Lifanov. At first glance the inspecting officers did not note any particular deficiencies, but they gave only a mark of satisfactory to the condition of the aircraft. The fact is that during inspection of the aircraft's armament they discovered infractions committed by the men of the group led by Sr Lt Tech Serv S. Yegorov: there were no caps on the missile-mount pylons, and they discovered a loose plug connector.

This immediately alerted party member Engr-Maj F. Farafonov, who was inspecting the armament. He proceeded thoroughly to examine each and every part and assembly. The fact that connector assemblies were not fully tightened down, that rubber seals were missing on the system inlet cap, and that there were signs of corrosion on the holder beam and on the signaling rods did not escape his vigilant eye.

Analyzing deficiencies right there on the flight line, Engineer-Major Farafonov made strongly critical comments to officer Yegorov and his men and comprehensively critiqued their performance. He also mentioned perfunctory accomplishment of socialist pledges. He gave the ground crew's performance a rating of unsatisfactory.

According to current regulations, the condition of the aircraft as a whole should have received the same mark. A mark one point higher appeared in the log, however. Why was this? A lack of coordination among the members of the inspecting team. Only the leader of the inspection team spotted the disturbing maintenance omission. It was necessary to repeat the inspection. This time the right mark was given for maintenance of this aircraft.

This incident served as a lesson to us, from which we drew the proper conclusions. It reminded us that the principle of a scientifically substantiated approach to management and control is incompatible with a lack of objectivity bordering on irresponsibility and a complacent attitude. We must frankly admit that one still encounters aviation engineers who, without looking into details and inspecting equipment in an offhand manner, fail to display proper concern with indoctrinating and instructing their subordinates, and fail to utilize specific-purpose inspections toward this end.

A serious, frank and firm discussion about innovative performence of duties and intelligent engineer initiative was recently held in the technical section of the unit's methods council. At a party meeting Communists examined in detail the activities of certain aviation engineer service officers in light of the demands of the November (1982) CPSU Central Committee Plenum.

The role of the engineer in efficient aircraft maintenance has become immeasurably greater today. In order correctly to organize inspection of the condition of aircraft equipment and in order effectively to utilize the capabilities and labor of his subordinates, the aviation engineer must take a great deal into consideration. He can fully reveal his capabilities in this area and find a point against which to apply his knowledge and resources.

In our regiment specific-purpose aircraft inspections by ranking aviation engineer service officers are specified in the schedules to be found in the squadrons and the unit aviation engineer service planning office. Serious attention is focused on precise execution of these schedules. We make extensive use of instrument inspecting methods and the requisite testing equipment in inspecting an aircraft. This enables us more thoroughly and accurately to predict the performance of all aircraft systems and assemblies.

Party member S. Mishin, an experienced specialist-supervisor, presents an example of conscientious performance of his duties. When inspecting an aircraft he examines not only the condition of the equipment but also the knowledge of the maintenance personnel and their ability quickly to spot problems. Such was the case, for example, when he was inspecting an aircraft serviced by young officer V. Pasichenko. Sergey Matveyevich carefully inspected the aircraft and its documentation and inquired to determine the extent of the lieutenant's knowledge of fire-hazardous locations on the aircraft. The officer did not give a precise and confident reply to all of the questions. In view of this fact, the engineer gave him recommendations on servicing the aircraft's systems and powerplant and advised him on how better to plan his preparation for taking the examinations to earn a higher proficiency rating.

Based on the results of this inspection, officer Mishin conducted a detailed critique with personnel, analyzing the causes of errors. Subsequently, at the initiative of Sergey Matveyevich and with the approval of the commanding officer, party activists formulated specific measures aimed at improving the technical knowledgeability of aviation engineer service personnel and their responsibility for prompt and high-quality fighter-bomber servicing.

One can scarcely exaggerate the engineer's role in the conduct of specific-purpose inspections. This school for improving the professional expertise of aviation personnel contains an inexhaustible source of experience and know-how in efficient aircraft maintenance. We extensively disseminate the results of such inspections in visual aids: graphs, diagrams, posters, and data tables. The schedules "Monthly Record of Meeting Aircraft Inspection Norms by Aviation Engineer Services Ranking Personnel," "Aircraft Time-Logged Record Graph" and other schedules and graphs have been well put together, for example.

Engineers devote close attention during specific-purpose inspections to expanding the technical knowledgeability of aviation engineer service specialists and toward enhancing the role of prevention of errors and miscalculations, which can lead to aircraft equipment malfunctions. The unit regularly holds conferences on exchange of experience and know-how in equipment maintenance, especially powerplant maintenance, practice drills, and demonstration aircraft inspections with the participation of flight personnel, engineers and technicians.

One such measure was recently conducted in the regiment's technical maintenance unit. Experienced engineers officers V. Mel'nichenko, S. Zhuk, and S. Mishin analyzed the aircraft inspection sequence, reminded personnel of malfunctions which can occur in the operation of specific assemblies, equipment units and systems, and pointed out typical flight and ground maintenance personnel errors. Such activities are very useful.

I shall cite another example. Lt Tech Serv A. Guzheliya and flight technical maintenance unit chief officer A. Bolgov were preflighting an aircraft. Giving the high-pressure rotor a spin, they heard a strange sound. Further investigation revealed a malfunction. It was promptly corrected. The officers were commended by the regimental commander.

Certain efforts are being made in the unit in the current training year aimed at enhancing the role played by inspections in aircraft reliability. Now not a single inspection check is ignored by the commanding officer, the party and Komsomol organizations. Once each month an order is issued on the basis of inspection results, and the engineers analyze the activities of the aviation engineer service specialists to maintain the aircraft combat-ready.

Constant search, thorough scientific analysis of the condition of aircraft, and adoption of new and progressive items in the performance of specific-purpose inspections -- this is the work style of our finest engineers, who are performing responsible tasks in the period of intensive flight training.

3024
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IMPORTANCE OF WINTEK ANTICIPATORY AIRFIELD MAINTENANCE STRESSED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 83 (signed to press 2 Jun 83) pp 36-37

[Article, published under the heading "They Provide Support for Flight Operations," by Col G. Bobrov: "Concern for the Airfield"]

[Text] Summer combat training is in full swing -- this is a decisive training period. These days things are rarely quiet at our airfields: pilots, navigators, and other personnel are improving their tactical and weapon skills, their piloting technique and combat employment of aircraft systems at tactical flight exercises with live-fire gunnery and bombing at gunnery and bombing ranges. This is also a critical period for the specialists of airfield maintenance subunits, which have the job of caring for runways, taxiways, flight lines, and other airfield facilities.

At the same time Air Force rear services personnel should already today be preparing airfields for winter operations. The rhythm and quality of flight training, and consequently the combat readiness of aviation units and subunits, as well as further improvement in the air, tactical, and weapons proficiency of aircrews will depend in large measure on how the commanding officers of aviation technical units use the summer months for performing preventive maintenance.

Vanguard military units are already now, in the warm season, commencing to ready airfields for winter operations. The specialists of the excellent-rated company under the command of Capt A. Polyakov have approached this important job in a thoughtful and stewardly manner. In this subunit they have drawn up a schedule in advance, have determined the sequence of performance of tasks, have prepared a list of required equipment and materials, and have coordinated and reached agreement on a timetable and the immediate executing personnel taking into account the heavy scheduling of flight operations.

But it is a rather complicated task to handle simultaneously a large number of jobs, while at the same time maintaining runways, taxiways, and other facilities in a continuous state of combat readiness, for the airfield is operating practically every day -- as a rule flight operations run in two shifts.

Making good use of every hour of decent weather, the personnel of this excellent-rated company, a right-flanker in socialist competition, are working hard. The

men are patching damaged paved surface, are repainting markings, are inspecting and repairing the water drainage system, are filling in seams between paving slabs, are replacing damaged slabs, are caring for the grass, are repairing unpaved parts of the airfield, and are readying equipment for winter.

In the spring the unit commanding officer, his deputies and the commander of the airfield maintenance subunit thoroughly inspected all facilities and service lines on the airfield and assessed their condition. They then discussed at a conference of officers the question of performing preventive maintenance procedures during the summer. The subject of proper airfield maintenance and keeping the airfield in a continuous state of readiness was also discussed at a party meeting. Party members self-critically revealed deficiencies and made suggestions on correcting them. In particular, they noted that personnel require a good knowledge of the equipment, a conscientious attitude toward their job, a high degree of efficiency, and precise observance of the requirements of the appropriate procedures, regulations, and other standard-specifying documents. Serious attention was devoted to proper organization of the labor of military personnel and developing in them excellent moral-political and professional qualities as well as a feeling of responsibility for precise observance of specified rules and procedures of airfield operation, maintenance and routine repairs. Aviation personnel are taking active part in socialist competition, are persistently studying and adopting advanced work methods pertaining to caring for runways, taxiways, flight lines, and flight operations support ground maintenance facilities.

Subunit commander Capt A. Polyakov submits a daily report to the unit commanding officer on what has been done during the preceding 24 hours, as well as on the quality of work performed. This approach to the job is improving the effectiveness of checking and inspection and is helping maintain a precise work rhythm.

Experience indicates that even the slightest negligent action will inevitably lead to undesirable consequences. For example, failure to employ the proper procedure in filling in seams between paving slabs can lead to moisture getting under the slabs and consequently to subsidence, cracking, and other damage during the fall and winter. This is why this job is assigned to personnel who have received special training. They receive constant help and recommendations from higher-echelon supervisors and the engineer reponsible for airfield maintenance.

In repairing airfield paved surfaces, the maintenance specialists employ such modern, highly-effective materials as RBV-25, -35, and -50 rubberized asphalt mastics, AB-2 compound, and synthetic resins. Epoxy compounds are used in filling cracks, ruts, chuckholes, and repairing slab edges and joints. These compounds are based on ED-5, ED-6, and ED-20 epoxy resins. Polyethylene polyamine or hexamethylene diamine is used as hardener, acetone is used as solvent, dibutyl pnthalate as plasticizer, and pure quartz sand and cement as filler. In addition epoxy glue is used to fill cracks and as a primer, consisting of epoxy resin, hardener (10-20 percent of the resin by weight), plasticizer (10-30 percent), and solvent (5-10 percent).

Before performing repairs, all cracks, sheared spots, and seams are thoroughly cleaned, washed, and compressed-air blasted. Grass in cracks and joints

between slabs is killed with a herbicide solution. Combined spraying-washing and vacuum-cleaning machines and power brushes are employed with a large volume of work.

While performing these procedures, personnel want to make sure that no pieces of mastic, concrete, crushed rock or other objects are left on the runway, flight line, or taxiways, which during aircraft taxiing and takeoff could enter the air intakes and damage the engine. Briefings, drills, and training classes are held with specialists on a regular basis, at which they acquire the requisite skills in performing all types of airfield maintenance work. Strong attention is focused on observing safety procedures. Every man in the subunit is thoroughly familiar with his duties and knows precisely what he is to do and how, and what machinery, materials, and tools are to be employed.

Cracks up to 2 mm wide, small areas of chipping or peeling up to 5 mm in depth, and pavement with minor damage is best patched with two or three layers of primer (an asphalt or mastic solution in gasoline or kerosene), allowing each to dry thoroughly before applying the next. If cracks going completely through the pavement and up to 6 mm wide, chipped-off corners and edges of slabs up to 5 cm in width and up to 10 cm in depth are discovered on paved areas, they are treated and filled in with epoxy compounds, rubberized asphalt mastics, or cement-and-sand concrete. Uniform slab subsidence of from 5 to 10 cm is leveled with a bituminous concrete patching strip, which is applied in one or two layers to the entire surface flush with the surface of the surrounding slabs. Totally fractured slabs are pulled out, fragments removed, the roadbed reprepared, and the section reconcreted.

Other preventive maintenance is also performed on the airfield during the summer, involving correction of paving defects and damage, repainting markings, and performing repairs on buildings and roads.

An important component of airfield maintenance is painting markings, which are needed for facilitating takeoff, landing and taxiing. The centerlines of hard-surface runways and taxiways are indicated by dashed lines. The dashed-line mark on a runway is 30 meters in length and 0.5 m in width; the centerline marks on taxiways are 15 and 0.15 m respectively. In addition, lines are placed on the runway to indicate the runway threshold and touchdown areas. White paints (enamel and nitrocellulose enamel) or various silicate colors and whitewashes are employed for this. Special prism-shaped markers, flags and other devices are employed to mark runway edges and ends, alternate unpaved airstrips and runway approaches.

There is also considerable work to be done on dirt and grass strips. This work includes improving the sod cover, packing the ground, and cutting grass. Efforts are also made to combat rodents.

During this same time of year airfield maintenance subunit personnel ready for winter airfield vehicles, bulldozers, bucket-wheel trench diggers, combination spraying and washing machines, heating and other equipment, which help keep the airfield in a state of operational readiness.

Performing this important work, aviation rear services personnel know that the promptness and quality of their work determines to a great degree safety of flight operations, maintaining complex aircraft in operating order, effectiveness of training, and further improvement in the air, tactical, and weapons proficiency of our Air Force flight personnel.

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IMPORTANCE OF FOLLOWING PROPER AIRCRAFT MAINTENANCE PROCEDURES EMPHASIZED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 83 (signed to press 2 Jun 83) pp 37-38

[Article, published under the heading "Experience of the Finest Into the Combat Arsenal," by Engr-Capt O. Zlobin, regimental technical maintenance unit chief: "A Foundation of Technological Discipline"]

[Text] A landing gear mudguard was damaged on a bomber brought to the technical maintenance unit for routine servicing. Capt Tech Serv V. Aleksandrovich, chief of the airframe and powerplant group, inspecting the guard, concluded that it had most probably been hit by a stone thrown by the tire. The officer gave appropriate instructions to the mechanics of the sheet metal and mechanical shop group, who quickly corrected the problem.

When they reported the repair complete to the airframe and powerplant group chief, he ordered the landing gear tested. This required placing hydraulic jacks under the aircraft, hooking up external power, and utilizing other ground equipment. This operation takes considerable time and manpower.

"Does the landing gear really have to be tested in this way?" several specialists asked one another. "After all, the geometric dimensions of the guard have not changed, and the specified maintenance procedures do not require such a punctilious testing of the gear. What's more, as the aircraft maintenance technician assures us, the hydraulic system was working properly."

Captain Technical Service Aleksandrovich was adamant in his decision, however. And he was quite right. Although the repair was indeed simple, nevertheless the slightest error could affect landing gear operation, for there is a possibility that during assembly the mechanic could have inadvertently used the wrong washer, used a bolt with a worn thread or the wrong shim. Experience indicates that even errors such as these are capable of altering the gaps between moving parts and structural components and can cause serious damage when cycling the gear. And the guideline documents which specify equipment maintenance procedures warn about this.

They test-cycled the landing gear. They found no problems, but this does not mean that the officer's demand was unnecessary. The test helped ensure that the aircraft's landing gear was in perfect working order.

After the servicing work was completed and the bomber was returned to the squadron, the group chief held a technical analysis session with his men. Replying to the question of why he had been so strict about testing the landing gear, he mentioned an incident which had taken place quite some time ago. In the course of a preventive maintenance inspection he checked tension on an engine control cable. It was also a simple operation.

"I performed it," the officer recounted, "but for some reason I could not shake the feeling that I had left out something important. I mentally went through the procedures I had followed, checking them off against the maintenance procedures checklist. And I remembered that before beginning the check I had failed to compare the readings between the testing and standard strain gauge. The checklist mentioned it, but I had considered such an operation trivial. After checking the parameters it turned out that the strain gauge readings were wrong and that the instrument was out of adjustment. I had to redo the entire operation, spending additional time on it. You can imagine the potential consequences of poor performance of this operation. That incident taught me a great deal...."

The officer reminded the group's specialists about the demands of procedures discipline and the fact that it is essential faithfully to execute every point of instructions and regulations. The analysis session was highly instructive.

Matters of military and procedures discipline in the technical maintenance unit are sharply addressed not only at technical analysis sessions. They are also discussed at party and Komsomol meetings, at professional meetings, and at flight-technical conferences. This is due not to the fact that discipline is poor in the subunit or that the pilots have serious complaints against the servicing and maintenance people. In addition, for a long period of time now the technical maintenance unit has been rated excellent, and it was designated as one of the best in the district on the basis of last year's socialist competition results. We constantly focus attention on matters of military and procedures discipline because they are key items in the effort to achieve new military performance levels.

Presently, competing under the slogan "Increase vigilance and reliably ensure the security of the homeland!," technical maintenance unit engineers, technicians, and mechanics are endeavoring to achieve new and higher levels of performance. Party-member officers S. Ruban, M. Dem'yanenko, A. Kushnerov, V. Lushchik and others organize their men's labor in such a manner as to ensure that they perform repairs and preventive maintenance procedures on the aircraft with no mark other than good and excellent, and that they do not perform shoddy work. And a most important condition for their success is rigorous observance of the requirements of maintenance procedures, military discipline, and an implacable attitude toward the slightest deficiencies.

During the most recent testing, personnel displayed thorough knowledge of the physical processes taking place in the systems. The men display intelligent initiative in performing complex tasks. Close monitoring of performance of operations has been established in the technical maintenance unit, and mutual relationships as specified by regulations are faithfully observed. And if

deviations do occasionally occur, response is firm and severe, with strict measures applied to those who violate rules and regulations.

I recall a mistake made by Sgt Ye. Sorokin: checking hydraulic system filters, he was in a hurry, got the filters mixed up, and even ended up with one too many. Without waiting for the work shift to end, the group chief assembled his men, told them what had happened, and showed them the result of violating service and maintenance procedures.

"Sorokin is an experienced mechanic," the officer noted. "It would have been no problem for him to check the markings on the filter elements off against the diagrams in the maintenance book, but he failed to do so. And his carelessness had immediate results."

The group chief also stated serious complaints against the senior technician, who had failed adequately to supervise the specialists in their work. I should add that the guilty parties were punished.

Now prior to beginning each workday the group chiefs and senior technicians brief their men on the tasks assigned prior to the work shift and briefly quiz them on how well they have assimilated the information, and test their knowledge of safety rules, servicing and maintenance procedures. They have a particularly serious attitude about this in the aircraft equipment group headed by Capt Tech Serv F. Dudogo, one of the regiment's most highly skilled specialists. This exceptionally knowledgeable officer, who is demanding both on himself and his men, is conscientious in matters both large and small. And he works patiently to instill this valuable quality in his men. In his group the men start and stop work and take breaks only on command. A mechanic immediately reports to a supervising officer on completion of maintenance operations, and the officer inspects the job without delay.

In order to maintain a smooth work rhythm, officer F. Dudogo distributes the work in such a manner that the working mechanics are not excessively crowded together at so-called bottlenecks: in the cockpit, at the bays, etc. It sometimes happens that when a maintenance specialist discovers a problem, he does not always complete the repair within the standard time. In such cases the group chief gets assistance to him and creates all necessary conditions for quickly correcting malfunctions.

In the aircraft equipment group, just as in the other groups, the aviation personnel have built mobile work stations for themselves: carts carrying the tools, devices and testing instruments for the most labor-intensive operations and equipped with servicing manuals and maintenance documentation. Making the work stations more efficient helps achieve better results. First of all the time required to ready tools is significantly reduced: tools are positioned in the required sequence and there is no need to go to the tool room for expendable materials or to wait for any devices or portable test instruments. Excerpts from guideline documents remind the mechanics where they should be positioned during movement of a variable-sweep wing, powered horizontal stabilizer, and variable inlets or when checking the landing gear as well as specifying mechanic procedures in each particular instance.

This new innovation is also very useful in powerplant takedown and installation operations. Of course the maintenance procedure descriptions cannot go into great detail on all specific features of detaching and removing parts, adjusting gaps and clearances, etc. The maintenance specialist's experience is helpful here. For example, high proficiency-rated mechanics warrant officers P. Stetsenko, M. Smirnov, A. Sharapov, A. Lyakhovets, and others, who have had a great amount of practical experience, know whatever must be applied and where in order not to damage engine plumbing or parts. Based on their experience, they have made changes in the procedures and are taking additional steps to protect assemblies against damage. With their participation, the group has fashioned protective end caps and other devices of plywood and other materials at hand. Each has its own special place on the cart, which keeps them from getting lost.

The commercial-quality mobile work stations have been considerably improved. Efficiency innovators have additionally equipped them with everything necessary for performing maintenance procedures. As we know, prior to inspecting inlet ducts a maintenance specialist should remove all foreign objects from his pockets. We have a special tray for these. We have another tray for protective footwear from the individual mass destruction weapons protective gear kit. Signs remind the technician to check to make sure the bulbs are secure in the light used to illuminate the compressor straightener vanes, as well as to observe other precautionary measures. Strict observance of regulations and manuals enables personnel to avoid premature removal of aircraft engines and prevent various violations of maintenance procedures discipline.

The job of the technical maintenance unit specialists becomes more difficult in the busy summer period. Personnel are filled with desire to do everything they can to ensure failure-free aircraft operation. The thoughts and deeds of our aviation personnel are permeated with efforts to maintain the coveted rating of excellent technical maintenance unit and to honor in a worthy manner an important date in the history of our party and the Soviet people -- the 80th anniversary of the convening of the 2nd RSDWP Congress.

8024
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REASONS FOR AF SCHOOL FAILING, DISMISSALS PROBED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 7, Jul 83 (signed to press 2 Jun 83) pp 39-40

[Article, published under the heading "From Military Educational Institution Affairs," by military pilot 1st class Maj Gen Avn G. Demendeyev and Col V. Kurochkin: "Why Was He Dismissed From the Service School?"]

[Text] As we know, young men enroll voluntarily in service schools. The majority of young men go into aviation following the call of their heart, and possessing the appropriate prerequisite education and state of health. They study hard and learn the profession of military pilot. But unfortunately not all who enroll successfully graduate. In the process of training, some cadets must be washed out for failure to meet performance standards in flying and in the classroom, by reason of health, or dimissed for lack of discipline or sometimes for lack of desire to study.

The faculty and staff at our school endeavor to send well prepared pilots to the line units, so that they will not require completion of training and re-indoctrination in these units. Failure in work with cadets will immediately become evident in the regiment, which will unquestionably affect its combat readiness and the reputation of the school involved.

Young men are dismissed for the most part in the first and second years for lack of desire to study. What are the reasons for this? There are several. Some young men prove to be unprepared to endure the difficulties of military service. Errors of omission also occur on the part of their immediate indoctrinators, who fail to show proper attention and paternal concern toward first-year cadets. Unit commanders do not always use adequate care and thought in sending compulsory-service personnel on to service school: some secondary-school graduates enroll in a service school only to look around and have a good time. Some secondary-school graduates do not know upon entering service school what aircraft they will be flying; it has happened that they have stated that they only want to fly fighters. Another factor involved is inadequate publicity of the strong points of the equipment on which they are trained.

We helicopter pilots respect fighter pilots and admire their interesting and romance-filled service. But today's helicopter pilot can fly combat missions involving destroying ground targets and engage in aerial combat -- just like a

fighter! -- and, in addition, can haul supplies and deliver assault troops, like transport aviation pilots. We make this as clear as possible to the secondary-school graduates and first-year cadets.

We make particular demands on commanders, teachers, and pilot-instructors. The closest attention is devoted to the ability of company and platoon commanders, especially young ones, to establish correct interpersonal relations with the cadets as prescribed by regulations, for young people do not always immediately grasp the main provisions of regulations and, as the cadets themselves tell us, do not always understand what is wanted of them. In indoctrination work with commanders, emphasis is placed on demandingness in combination with paternal concern for subordinates, on a solid foundation in conformity with regulations.

In order to avoid the necessity of dismissing cadets for lack of desire to study, the school's officers visit the localities, meet young people, and brief them in detail on school studies, daily life and flying activities. At the service school we regularly hold evening get-togethers between secondary-school graduates and advanced cadets, pilot-instructors, flight and squadron commanders, teachers, platoon, company, and battalion commanders. We arrange mandatory visits by secondary-school graduates or newly-enrolled cadets to witness flight operations, where they are shown how the advanced classes fly. Sometimes the following practice is followed: first-year cadets who have already received certain theory instruction, are shown an autorotation helicopter landing. This convinces young aviators that landing a helicopter when the engine fails is safe even into a limited-size landing area. In all instances when a cadet loses the desire to study and submits a request to leave the school, the actual reasons are determined in a personal interview with him.

In the fall the advanced cadets spend 2 to 3 months performing the duties of lower-echelon commanders with the first-year cadets. This is good practical experience for senior cadets, helping them reinforce their knowledge of regulations with practical activities, while it benefits the first-year cadets by giving them communication with persons whose position is already rather firm in matters pertaining to military service and flying. The older cadets help the younger ones stand more firmly to their chosen course.

In addition, the young cadets take part in the official formation by the school's personnel on the occasion of graduation of pilot-officers. Even for those who have served for many years in the Soviet Army, this is a genuinely festive event, impressive in the solemnity of military rituals: an order of the USSR minister of defense is read aloud, graduation diplomas are awarded, and the young officers bid farewell to the school's colors and their instructors. All this instills love for the flying profession and to some degree diminishes the number of persons wishing to drop out of service school prior to graduating.

Sometimes cadets are dismissed due to lack of discipline. Unfortunately this occurs in all classes. Of course it is a great pity when it is necessary to dismiss an advanced cadet, for a cadet's value becomes greater in all respects with each passing year. Why is it that a young man, who dreamed of enrolling in flight school, is dismissed due to lack of discipline? An analysis indicates that some young platoon and company commanders, especially for first-year cadets,

impose a great many harsh punishments on their subordinates. As we know, a person is restrained from committing an infraction not only by the punishment he will receive for it but also by a feeling of responsibility to his comrades and their participation in condemning a punishable offense. But if a first-year cadet ends up in the guardhouse right away, it is hardly likely that in the future anything can keep him from committing offenses. He becomes accustomed to strict punishments and responds little to ordinary demerits and even reprimands. It is necessary to resort to detention, but only after other means of influence have failed to produce indoctrinational effect.

And now a few words about the number of times a person is put on report. The cadets of some companies and platoons were not always aware of being put on report (demerits both cancelled and allowed to stand). And when the cadets in question would be summoned to appear before the school council, they would be surprised at the number of demerits. At a meeting of the school council, the council drew up specific recommendations for all categories of indoctrinators pertaining to matters of disciplinary practices and handling demerits and commendations. This immediately produced a positive result.

Although the percentage of cadets washing out in flight training is small, the school's administration and flight instructors cannot remain indifferent, since this directly affects the selection system. In spite of improvement each year in the method of psychological selection of candidates, it becomes evident in the process of dual flight instruction that certain candidates are unable to master helicopter flying. This indicates first and foremost incorrect determination of the aptitude of young men for flight training.

Cols A. Shlykov, B. Lysenko, Z. Sharafutdinov, and V. Khomutov do a great deal of work on matters of selection, flight training, proper interpersonal relations in cadet units and cadet assignment to training units. Here is an example. In the past pilot-instructors endeavored to have lower-echelon commanders (this applies to all NCOs) be among the first to solo. The reason for this practice is obvious: they must maintain authority. It would happen that certain lower-echelon commanders would wash out or would require more dual hours. Now the practice is to assign cadets as lower-echelon commanders following a thorough analysis of their activities and moral-psychological qualities, taking into consideration psychologist recommendations. In this case as a rule the lower-echelon commander truly becomes a leader, including in flight training.

The number of persons washing out of flight training can be substantially reduced with good simulator preparation of future pilots. As we know, the dual-instruction program cannot be extended beyond the established limit.

All categories of flight-instructor personnel have a stake in seeking and finding time reserves for flight training. Here is an example. A pilot-instructor teaches students to fly a helicopter. On some flights the student pilots function as navigators and take no part in flying the aircraft. As a result the helicopter, which could be carrying several persons, is "hauling" only one student on a cross-country flight. In order to use aircraft more efficiently and to increase the efficiency of navigator training, a helicopter could be

specially equipped, let us say, with 4 or 8 navigator positions accommodated in the cargo space. With this arrangement the section navigator can check calculations, check laying out the route, and can brief the student pilots. This idea is not new, but it has not been incorporated into helicopter pilot training practices.

We feel that there is also another important question: about the advisability of changing the training subunits for handling the first-year cadets. Experience indicates that greater effect is achieved when a subunit handles cadets only in a specific year (first or second, for example) for a period of 5 or 6 years.

At one time we had pilot basic training schools, at which personnel were enrolled for a year. Thus the instructors were always teaching novices. Of course this is hard duty. But they had developed a method of training student pilots who had not yet soloed, a method of developing firm skills in moral-psychological training, and they had a small dual-instruction program. Consequently, if only first-year cadets are taught in the same subunit for a period of several years, this will have a positive effect on the entire flight training process and may significantly reduce the number of cadets who resign, are washed out and dismissed, and could improve their training progress in subsequent years of study. If a pilot-instructor alternates between teaching the first and second year, naturally he will be excessively demanding on the first-year cadet and may fail to notice that a second-year cadet is falling behind. Of course all this is not totally without debate, but there is plenty to think about here.

A great deal in the training of future pilots depends on the methods preparedness of flight-instructor personnel. A great deal of work is done at our school in the area of instructor selection, training, and improvement of instructor methods skills. We take into consideration pilots' desire to work with young people, their teaching propensities, and their ability to bear responsibility for cadets' professional advancement. Of course the job of the pilot-instructor has its specific features and difficulties, and it is not always possible to staff a training subunit as one would wish.

Fewer cadets fail theory than flight training. But we are by no means claiming that everything is satisfactory regarding formal classroom study. As interviews have indicated, cadets fall behind in their studies because they are unable correctly to distribute their time in preparing for classes. For this reason the party and Komsomol organizations of the company, and subsequently the battalion as well should help them by word and deed. We could cite a great many examples where assistance by comrades has helped lagging students in the third and fourth years catch up with their fellow students and complete their studies with pretty fair grades. We offer special classes for first and second-year cadets on taking lecture notes, on working with primary sources, and on making study more effecient.

These measures are helping us reduce the number of cadets who fail. But we would like to know what is being done in this regard at other Air Force schools.

3024
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BEREZOVOY DESCRIBES 211-DAY MANNED ORBITAL MISSION

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[Article, published under the heading "Recollections on Space Flight," by USSR Pilot-Cosmonaut Hero of the Soviet Union Col Anatoliy Nikolayevich Berezovoy (article prepared by AVIATSIYA I KOSMONAVTIKA correspondents V. Gor'kov and N. Kon'kov): "211 Days in Orbit"]

[Text] USSR Pilot-Cosmonaut Hero of the Soviet Union Col A. N. Berezovoy was born on 11 April 1942 in the community of Enem, Oktyabrskiy Rayon, Adyge Autonomous Oblast. After graduating from secondary school, he worked for two years as a lathe operator at the Neftemash Plant in Novocherkassk. He graduated with distinction from the Order of Lenin Red-Banner Kachinskoye Higher Military Aviation Pilots School imeni A. F. Myasnikov. He subsequently served in aviation units. He is a military pilot 1st class, is type-rated on 8 different aircraft, and has logged a total of approximately 1500 flying hours. He joined the cosmonaut corps in 1970. He graduated from the Air Force Academy imeni Yu. A. Gagarin in 1977. As mission commander, accompanied by flight engineer V. Lebedev, he flew the longest manned space mission in history.

We publish Anatoliy Nikolayevich Berezovoy's reminiscences of this mission, put into literary form by AVIATSIYA I KOSMONAVTIKA correspondents V. Gor'kov and N. Kon'kov.

On Patrol

Like many of my comrades, I particularly liked visual observations. What is the reason for this? It is difficult to answer in a few words. I could see, for example, how excited Jean-Louis Chretien was looking at his native Brittany and Paris through the viewing port.

I must say that the longer you spend in orbit, the more you appreciate ordinary life on earth. Anybody who has been in space has a new appreciation of his place on earth. He begins to think and ponder more, his thoughts become broader, and his heart becomes kinder.

People become accustomed from childhood to communing with nature, and it gives them pleasure and a key to cognition of life. Valentin Lebedev had never before worked with growing plants, but every morning in the space station, the first thing he did after waking up would be to head for the Oazis experiment, where we were growing peas. Valentin said to me on repeated occasions that it was on this mission that he learned for the first time the delight of such an activity.

You will recall how during a time of repose, sitting in front of a campfire in the woods somewhere, we can just sit there gazing at the fire, sometimes without even noticing the passage of time. And we find tranquility in this magnetic contemplation. You experience a somewhat similar feeling in space, admiring your "vegetable garden."

Visual observations from space were for us a unique means of communing with familiar nature, which brought us quite terrestrial joy. We observed all the seasons from orbit -- we were launched into orbit in the spring, and the mission continued throughout the entire summer, fall, to the beginning of winter. It was very interesting to watch our planet changing its seasonal attire. At first the whiteness retreated under the onslaught of green, later the fields and forests were covered with gold, and then once again white appeared, but now its margin was moving in the other direction. But in general we did not have a great deal of time to spend admiring the earth's beauty: it was necessary to perform tasks for a number of organizations.

We made a detailed description of the state of forest areas in the Altay, in the Carpathians, and in Amur Oblast. We took part in making an inventory of water resources. Our rivers extend millions of kilometers, and 80 percent are beyond the Urals. But Siberia, and particularly the BAM [Baikal-Amur Mainline] zone, was perhaps the principal target of our investigations. We took photographs in order to refine and detail the geomorphological maps of that region, fault maps, which facilitate selecting tunnel construction sites, and stated preliminary conclusions on promising areas for mineral prospecting.

Farmers

I uttered this word and paused to think about it. It is used with great frequency in space program. Some people may like and others may not like this designation for one of the aspects of our activities in orbit. But of course the point is not the name used but rather the practical results achieved by manned missions. I believe that we made a contribution to agricultural knowledge. At the request of scientists we performed experiments in growing plants in space, photographed and observed row crops and grain crops at all stages of development in various parts of the Soviet Union.

First about our work on board the station. We cared for 10 species of plants in our "garden": wheat, oats, peas, borage, radishes, coriander, dill, carrots, and others. These are ordinary terrestrial plants which we are accustomed to seeing in our daily lives. But it is quite different in space: you have a new appreciation for their place. We viewed the appearance of each new leaf and shoot as a victory in the struggle against weightless. And this naturally brought joy.

We had a homely, unpretentious little plant about 10 centimeters tall -- Arabidopsis. On earth this weed is found primarily in quarries, mine dumps, and vacant land. And although this is one of the higher plants, nobody would pay attention to it if it were not for the space program. For the first time in the history of space flight, a plant transplanted on board a spacecraft produced seeds. Arabidopsis has a very fast development cycle -- as little as 1 month. On board Salyut-7 it was included in the Fiton system and was grown in a special nutrient medium. The plants were isolated from the space station's atmosphere with filters which kept out harmful impurities. After blossoming, pods appeared. They subsequently opened up, and we saw seeds. There were about 200 of them.

This success became possible due to improving the instrumentation and methods of performing the experiments. And although the peas, wheat, oats and other plants did not ripen, space biologists have taken their first confident stride into the genetics of higher plants. Biological experiments are not only of theoretical but of practical significance as well, for supplying cosmonauts with fresh vegetables will be no simple task in future missions to the planets of the solar system. And so we, not putting things off, proceeded at our own initiative to engage in vegetable gardening. We grew radishes, borage, various kinds of lettuce, and carrots. And we greeted Svetlana Savitskaya with Arabidopsis blossoming in the Fiton.

Our workday ran from 0800 to 2300 Moscow Standard Time. Almost one third of all the experiments involved earth observation. We took approximately 2500 frames (six spectrozonal images in each) with the fixed MKF-6M equipment, 200,000 spectra of various objects, and a great many hand-held still photographs and motion-picture sequences. On board the Salyut-7 we used equipment built not only in the USSR but also in Bulgaria, the German Democratic Republic, and Czechoslovakia. The Duga-M electrophotometric system and the Spektr-15M multispectral camera were the pride of Bulgarian specialists, the MKF-6M camera -- of GDR specialists, and the EFO-1 electronic photometer, with the aid of which we investigated the dust content of the atmosphere for about 30 hours -- of Czechoslovakian specialists.

From the images taken by the Salyut-7's photographic equipment experts can determine normal and drought-stressed crops, excessively wet and dry soils, and can identify areas in which plants have been stricken by disease and insect pests. Such information is certainly important. And data on massive occurrence of plant diseases can be obtained from orbit several days sooner than with traditional methods. And this means that treatment can be commenced sooner.

Why have I recalled this? I was born, grew up, and reached manhood in Krasnodar Kray. There is a scientific organization on the Kuban which is very interested in utilizing space hardware for the needs of agriculture. And when shortly before the mission I went home on leave, people from that organization made a convert out of me.

"Your reports from space," they argued, "will enable us to monitor the quality of the planting, will enable us to apply fertilizer to the crops, to water them and apply pesticides and herbicides in a timely manner, to select optimal times

for other crop-farming procedures, and to devise an economical crop harvesting strategy."

The specialists told me that they also had specific suggestions for Krasnodar Kray.

"We plan to designate several rayons for observations," they stated. "We would ask you to describe in the greatest possible detail the entire range of colors appearing on the fields in these areas, to note in detail how the 'green wave' of winter crops is moving across them, and to record the boundaries of spring flooding."

I wanted very much to help these local people. Their suggestions ultimately were incorporated in the mission program. From the very first days of the mission we actively conducted observations of areas in Krasnodar Kray. We noted the flooding progress along the Kuban and Laba rivers. We reported on the various coloration of the fields in Yeyskiy Rayon: the plowed fields were lighter in color, while the fields planted to winter crops were dark and dense. We photographed all localities of interest. Not test plots, as in the past, by aircraft, but genuine expanses of field. And this was enjoyable, for I was familiar with these localities. Simultaneously, or almost simultaneously, these areas were being studied down below as well, by aircraft. Thus we were amassing experience which in the future will enable us to establish a space data system supplying information on the status of crops and farmland.

Virgin Soil of an Ancient Science

The need to calculate the periods of flooding of the Nile was the reason for the creation of Egyptian astronomy. The famed pyramids, oriented according to the stars with an enviable accuracy even by today's standards, were observatories, sundials, and calendars in ancient times. And a long corridor penetrating the body of a pyramid served as a telescope.

The beginning of the 17th century ushered in a new era in the history of astronomy. The era of observing the starry sky with the unaided eye had come to an end. People began using the telescope for this purpose. And the first to do this was Galileo, who grasped the vast potential of this new instrument. Continuous improvement of the telescope continued through the course of three centuries. Instruments were created which were unique in size and precision. But nevertheless, from today's standpoint one can state that the volume of information obtained with the aid of these instruments is comparable to a beam of light passing through the keyhole of a locked door. And even this weak beam was perceived by astronomers, figuratively speaking, only in black and white.

In the middle of the 20th century our generation witnessed the birth of the next era in astronomy, the modern era. The door to the universe was opened slightly, and a flood of information across a broad electromagnetic spectrum streamed through the narrow crack. New fields of science arose. Astronomy acquired the prefixes "radio," infrared," "ultraviolet," "X-ray," and "gamma-ray." And still a large portion of information, at the end of its long journey

across the universe, was becoming lost in the extremely thin, on a cosmic scale, atmospheric envelope around our planet. The launching of the first Soviet artificial earth satellite on 4 October 1957 demonstrated that the door to the universe could be opened even wider. The prophetic words uttered by K. E. Tsiolkovskiy had come true: "A new, great era in astronomy -- an era of close scrutiny of the heavens, will begin from the moment the principles of rocket propulsion are employed."

One of the Progress craft delivered a modified Yelena-F gamma-ray telescope, designed to investigate high-energy electrons in near space and to measure photon fluxes at the space station. The Yelena modification enabled us quickly to shift from one type of measurement to another by simply replacing changeable units. And we obtained unique images. For example, an image of a shaft of zodiacal light against the background of a constellation, against which Venus is also projected. As the experts say, we noted for the first time a very interesting abnormal stratification of the earth's atmosphere. We succeeded in obtaining an image of silvery clouds illuminated by the sun. From this picture one can determine the size of the ice crystals forming these clouds. We photographed the great Andromeda Nebula, the Large Magellanic Cloud, and other objects on which the specialists needed various detailing.

Study of cosmic rays is of a combined nature. The Intercosmos-Bulgaria 1300 satellite, launched on 7 August 1981, is orbiting at an altitude of about 900 kilometers. It carries a similar instrument. Measurements are also being taken on the earth: in the mountains, at sea level, and underground. In the Pamirs and Tien Shan, in Moscow and Yakutsk, fluxes of cosmic rays are being trapped by unique large-scale (up to 20 square kilometers in area) facilities. Scientists hope to obtain an altitude profile of the characteristics of high energy electrons.

In order for such an approach to be understandable to the uninitiated reader, suffice it to say that an installation one square meter in size can trap a particle striking the atmosphere with an energy of 10^{19} electron volts only once in several million years. Such a particle, interacting with others, produces new high-speed particles, which in turn also multiply. These cascades merge into a stream of millions and billions of electrons, positrons, photons, and mesons -- an entire atmospheric shower of cosmic rays several kilometers in width. It is true that their signals are very weak. Suffice it to say that according to scientists' rough calculations the entire energy received by radio telescopes in the last 20 years would suffice only to heat a teaspoonful of water by one millionth of a degree. We should note that only distant descendants of the "primogenitor" -- the first particle -- are recorded not only on the earth's surface but also at altitudes of the Intercosmos-Bulgaria 1300 satellite's orbit. We also, working on board the Salyut-7, took part in determining the "portrait" of this first particle.

Acting as Their Own Doctors

Within 3 or 4 days of life on board the station we became fully adapted, as the doctors say, to weightlessness. One's system no longer protested against the strange features of life in space. One felt more energy, and work fitness returned. We slept almost as well as on earth. Weightlessness is unpleasant

only during the first few days, while later it is even pleasing, evidently due to its ease. But this state of comfort must be disrupted.

In space everything is just the opposite. On earth we were taught to adapt to weightlessness, while now that we were on intimate terms with it, we had to keep reminding ourselves of the force of gravity. The only way to overcome the effects of weightlessness at the present time is physical exercise. What joy morning calisthenics brings on earth! But up here you work yourself into a sweat... and it turns out that sessions on the exercise bicycle or treadmill are not a pleasant form of recreation in the gym but rather exhausting labor which takes up a great deal of work time. But we realized that this was the best way to achieve readaptation to gravity, and therefore we exercised without being reminded. What had to be done had to be done!

A new medical device, the Aelita, helped us check our state of health throughout the mission. Its size and fantastic capabilities are amazing. The Aelita is a stride forward in comparison with the Polinom which was used on the Salyut-5. It is simpler to operate and saves time spent on medical examination. And yet it takes the place of an entire functional diagnosis room at a city hospital and provides capability to study in detail the activity of the heart, vessels, brain, can take an EKG, and can enter data into the on-board computer. The Aelita, coupled with the Chibis vacuum suit, provides capability to study venous pressure, which is a difficult task even at a terrestrial clinic. But the main virtue of this instrument lies in its capability not simply to record certain indices of the cosmonaut's system but to perform qualitative analysis. It helps accomplish one of the most important tasks facing space medicine: to find an optimal duration of a manned mission, during which man can work with maximum efficiency in a given spacecraft.

The flows of blood and lymph, which are based on water, become redistributed in a state of weightlessness. And as we know, even a 10-percent water loss is dangerous to a person. This is why during the mission we carefully monitored our body weight for changes. It is not difficult to determine one's weight on earth, but it is more complicated in space: one cannot use terrestrial scales. Engineers had to invent a new device -- a mass meter. Everything about the new piece of equipment is rather unusual. Also unique is the posture which one must assume when weighing oneself. The cosmonaut assumes a semireclining position on a platform which is secured to springs. Holding tightly to the hand grips and foot supports, and pressing tightly against the platform, he puts the body into as rigid a position as possible. He squeezes a trigger, and the system begins to vibrate. The frequency of the vibrations is determined by his body's mass. Numbers light up on a display, indicating in standard units the period of oscillations of the "platform-man" system. From four to five measurements are made. Then the figures are averaged, and the weight is determined from a special table.

But we used the mass meter not only to determine our weight. We once conducted an experiment in the station involving collecting atmospheric moisure condensate not in a condensate collector but in the tank used in the waste disposal unit (ASU). The condensate collector would usually be discarded after it was filled, to be replaced by a new one delivered to the station by a Progress. Condensate

can be pumped out of the ASU tank into the empty Progress tanks, thus saving both a collector and room on board the station. And then other additional supplies needed in orbit can also be transported by the resupply vehicle.

Thus it was necessary to determine precisely, after filling the container, exactly how much condensate it contained. We determined this with the aid of the mass meter. Valentin first weighed himself with an empty container, and then with a full one. (To be continued)

3024
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SOVIET WEIGHTLESSNESS SIMULATION TANK DESCRIBED

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[Article, published under the heading "Cosmonaut Training," by candidates of technical sciences I. Pochkayev and V. Grigorenko and Engineer V. Skachkov: "In the Supportless Space of the Weightlessness Simulation Tank"]

[Text] Weightlessness is one of the principal adverse factors of space flight. It is rather difficult, however, to create on earth conditions close to weightlessness. We know of several methods of simulating weightlessness: flight in an aircraft following a parabolic trajectory, simulating weightlessness with the aid of straps, light gases and multistage stands, and weightlessness in water.

In an aircraft weightlessness is created for 27-30 seconds. Many operations cannot be reproduced in such a short period of time. In addition, the limited size of an aircraft and the relatively high cost of the flights make it impossible extensively to utilize this method for simulating various operations performed on a real-time basis.

Creation of conditions approximating weightlessness with the aid of straps, light gases, and a multistage stand is based on the principle of making the "man-space suit" system weightless. Multistage stands were employed at the initial stages of teaching man to work in space. They were subsequently abandoned, since they significantly distort the sensation of weightlessness.

The most common method of reproducing conditions close to weightlessness is hydroweightlessness, that is, creation of neutral buoyancy. It is based on Archimedes' principle. The test subject, wearing a space suit or diving suit, is immersed in a liquid medium. Lead weights are attached to the suit to neutralize positive buoyancy, and light materials such as styrofoam to neutralize negative buoyancy. Neutral buoyancy consists essentially in equalizing the weight of the suit and subject with that of the displaced liquid. The functions of the vestibule do not change, but the conditions of supportless space do not affect the physiological processes in the human organism. Another specific feature of hydroweightlessness is connected with the dynamics of suit movement. The test subject must expend energy to overcome water resistance. During accelerated or decelerated motion the inertial forces of the water act on the suit.

Therefore in performing operations it is very important to select movements which do not distort neutral buoyancy.

This method of simulating weightlessness has some advantages. First of all, a virtually unlimited duration of time under water enables the subject to practice work operations on a real-time basis. Secondly, the cost of cosmonaut training is relatively small.

The first training sessions in conditions of hydroweightlessness were conducted in the 1960's in the Black Sea. At the time a mock-up of a spacecraft, in the form of a mesh frame, was lowered to a depth of 10 meters. A cosmonaut would be lowered in a space suit and instructors in scuba gear. Later a weightlessness simulation tank and laboratory were built at the Cosmonaut Training Center imeni Yu. A. Gagarin. The hydrolaboratory is a complex structure containing an entire aggregate of equipment. The laboratory's principal facility is a cylindrical tank 23 meters in diameter and 12 meters deep. A platform carrying a mock-up of an orbital space station and a spacecraft moves within the tank. The platform can be lowered to any depth and raised by remote control. Spotlights illuminate the mock-up through viewing ports built into the tank wall, and a system of underwater TV cameras provides capabilities for continuous observation and for recording the entire dynamics of the training process at a central control station. Later the cosmonaut, viewing the video tape, reconstructs in his memory all those sensations he felt during his work session.

The mock-up of the Salyut-Soyuz orbital complex is full size, with full reproduction of the interior, internal and exterior configurations, interior passages, and exit from the station. Emergency exits are provided on the mock-ups in order to ensure safety of underwater activities. Scuba divers stand by under water to come to the cosmonauts' assistance if needed. The suits used by the cosmonauts for weightless simulation tank activities are practically identical to the standard space suits. Breathing air and coolant water are fed from life-support systems.

Information obtained during training activities are processed on a specialized computer and applied to peripheral devices: tape [or disk] units, recording instruments, printers, or visual displays at the central control station.

The hydrolaboratory makes it possible thoroughly to rehearse operations inside and on the exterior of the station on a real-time basis. Energy expenditures by and psychological stress on the cosmonauts are estimated. This is very important, since practical experience has shown that time and energy expenditures coincide in the weightlessness-simulating water environment and in actual conditions of space.

During practice sessions the cosmonauts' attention is drawn to organization of the work station, skillful utilization of various clamping devices, special appliances and tools, development of efficient locomotion techniques on the station exterior, smoothness and balance of motions, carrying and transferring of loads, teamwork and cooperation, safety-backing one another, observing safety rules and procedures, plus many other things. Considerable attention is also devoted to rehearsing cosmonaut response in special and emergency situations.

Training sessions in the simulation tank involve the participation and supervision of an instructor, who helps the cosmonaut trainee apply efforts in a timely manner and with the required intensity and helps him capture the rhythm of movements and develop the necessary movement coordination. A training session runs 3-4 hours. Cosmonauts spend a total of 30-50 hours in the simulation tank. During this time a spacecraft crew acquires solid skills in performing operations. Practice sessions end with a detailed analysis, at which the performance both of the crew and of each support personnel specialist is graded.

Each training cycle ends with a final test: crew members perform a complete program of operations, including unanticipated situations. This session more closely approximates the cosmonauts' work in orbit. All crew operations in depressurized compartments and on the exterior of the orbital station, communications and TV operations are conducted in conformity with on-board documentation according to the elaborated work and rest schedule, and tying in the mission to light and shadow.

In view of the potential of the simulation tank to recreated operations in space, it is used not only for training cosmonauts but also for ground following of dynamic operations performed on the station exterior on a real-time basis, and for giving crews suitable recommendations when necessary.

Post-mission analysis of the operating activities of Soyuz spacecraft and Salyut orbital station crews provides a basis for confirming that cosmonauts who have gone through a complete training cycle in the simulation tank achieve a high level of effectiveness of operating activities on an actual mission.

Weightlessness simulation tank training has become an integral part of the cosmonaut training program established at the Cosmonaut Training Center imeni Yu. A. Gagarin.

3024
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U.S. SURVEILLANCE AIRCRAFT CASTIGATED

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[Article published under the heading "Abroad" by Maj V. Koshchupkin: "NATO's Winged Spies"; based on materials published in the foreign press]

[Text] "The word 'spy' evokes a great many associations. I would prefer to say that there will always be a place for observation." This statement was made by the U.S. Director of Central Intelligence in an interview with a correspondent from the NEW YORK DAILY NEWS.

Spies also "observe." They observe the USSR and the other socialist countries, as well as the young nations of Asia, Africa, and Latin America which have embarked upon an independent path of development. A special role is assigned to technical means of collecting intelligence.

The U.S. military periodical ARMED FORCES JOURNAL reported that the generals at the Pentagon are aggressively formulating a so-called "deep strike" strategy. Its main objective is the conduct of electronic warfare against the socialist countries, establishment of an extensive network of stations for guiding missiles to targets deep in enemy territory, jamming and interception of radio traffic. Various ground equipment and aircraft equipped with electronic intelligence collecting gear are employed for this purpose.

...On a cloudy March day in 1981 the news service teletype machines in various countries tapped out a report about the loss of a U.S. RC-135 aircraft. More than 20 persons on board were killed, and several were lost without a trace. This incident might not have attracted any particular attention, but the fact is that it was a reconnaissance aircraft and the accident took place in the Aleutian Islands, that is, not far from the Far Eastern borders of the USSR.

Thus the report of the loss of a U.S. reconnaissance aircraft in Far-Eastern waters reconfirms the fact that the Pentagon is running spy plane flights along the borders of the Soviet Union, and not only in the Far East.

A British television company was filming at a U.S. Air Force base at Mildenhall, England. Everything seemed to be proceeding according to a well-rehearsed plan. Spokesmen for the U.S. Air Force officially denied that spy planes were based at

that facility. But imagine the embarrassment of the command authorities when one of the notorious U-2 spy planes, which was making a landing approach, suddenly appeared in front of the cameras. The U.S. military authorities, attempting with one hand to conceal from an indignant British public the fact that U-2 aircraft were based at Mildenhall, apparently did not know what the other hand was doing. The U.S. Air Force periodical AIR FORCE MAGAZINE frankly admitted that electronic reconnaissance squadron specialists were stationed at Mildenhall. The equipment they operate is intended for the collection of intelligence during spy plane flights close to the borders of the USSR and the other Warsaw Pact member nations.

Recently specialized aircraft carrying electronic intelligence gathering gear have been increasingly utilized by the Pentagon on behalf of espionage agencies. They are stationed at U.S. Air Force bases in England, the FRG, Turkey, on Cyprus, in Japan and South Korea, and are used for the conduct of electronic espionage against the USSR and other socialist countries. We must note that recently, according to reports in the foreign press, sinister spy plane activities have been stepped up against the Arab countries.

We shall recall the performance characteristics of some of the aircraft of this type. The SR-71 strategic reconnaissance aircraft, which carries a crew of two, according to information published in the West, has a top speed of 3200 km/h, can fly at an altitude of 24 km, and has an operating radius of 4800 km. The notorious U-2 aircraft continue to be used in airborne electronic intelligence gathering activities. One of these was once downed by Soviet missile crews over Soviet territory.

It was reported in the U.S. press that production of the new TR-1 reconnaissance aircraft, the design of which is based on the U-2, recently began at a factory in Palmdale, California. It is 40 percent larger than its prototype and carries highly sophisticated electronic equipment capable of conducting surveillance to a depth of 700 miles.

The Pentagon has placed an order for 35 of these aircraft to be delivered over the next five years, each of which will cost 12.5 million dollars. In addition, a total of 200 million dollars is to be spent on development and testing of the new spy plane. According to a statement made by an official involved in the TR-1 development and production program, the new aircraft will be stationed in NATO countries to "observe enemy troop movements."

As is reported in the foreign press, the first TR-1s arrived in the United Kingdom this past February. They are stationed at an Air Force base at Alconbury. U.S. military authorities intend to deploy 18 of these aircraft in the United Kingdom, to replace the ill-famed U-2.

According to reports in the press, these new U.S. winged spies will patrol over the European continent and in the Near East. The newspaper GUARDIAN plainly states that the TR-1s will, in particular, fly missions along the borders of the GDR and the other socialist countries, gathering various intelligence.

The aircraft companies, which have grown rich building military hardware, judging by all indications proceed from the following principle: the worse it is, the better. The worse relations become between nations with differing social systems, the tenser the international situation becomes, the better it is for the bosses of the monopolies which are working for war, opposing peace, détente, and mutual trust between peoples. Thus the Pentagon gets spy planes, and the monopolies get huge profits from building them. We have here a close interweaving of the interests of the U.S. military establishment, the intelligence services, and the notorious military-industrial complex.

NATO authorities, however, are presently counting the most heavily in the area of aerial electronic espionage on AWACS -- Airborne Warning and Control System -- aircraft. The E-3A aircraft, based on the Boeing 707 passenger aircraft, weighs 150 tons, cruises at 670 km/h at an altitude of 10,000 meters, and has an unrefueled endurance of 11 hours. It carries radar with a 9-meter diameter antenna in a fairing above the fuselage. It carries tons of electronic gear on board: radar, a computer system, communications and identification equipment.

According to the calculations of the experts at the Pentagon, the E-3A "flying radar" will maintain station at a point up to 300 kilometers from the battle line and maintain surveillance of a zone up to 80 km deep beyond the front lines. In one of the first publicity flights on the European continent, an aircraft carrying high Bundeswehr officials on board flew along the border of the GDR. The West German generals had an opportunity to see with their own eyes the capabilities of this spy plane.

The majority of the NATO member nations have decided to purchase AWACS aircraft. The total cost of this project, as reported in the foreign press, amounts to 3.8 billion West German marks. This is the largest-ever military aviation program financed by the West European NATO countries.

At the beginning of 1982 a ceremony took place at a plant of West Germany's Dornier military aviation company near Munich, marking official delivery to NATO command authorities of the first AWACS-equipped aircraft for collecting intelligence. The contract calls for this company to equip by 1985 an additional 17 U.S. Boeing aircraft with electronic espionage gear specific "for European conditions." Other big companies in the FRG are also taking part in carrying out this large-scale NATO Program.

The first AWACS early radar warning and control system aircraft soon arrived at a NATO airbase at Geilenkirchen (Nordrhein-Westfalen, West Germany). NATO command authorities intend for this base to become the principal center for the operations of all 18 aircraft of this type. British Nimrod aircraft, which are also designed for the conduct of air electronic reconnaissance, are also to be placed under the control of the NATO headquarters at Geilenkirchen. As we know, the United Kingdom is developing its own aerial espionage system, employing the above-mentioned aircraft. Although France has turned down participation in deployment of the AWACS system, it has expressed the desire to pay for espionage information obtained by the "flying radars."

Thus the foundations for NATO's first intelligence service of its own have been laid down in Western Europe. As was noted in the FRG press, the objective is

to make "more efficient" the system of spying on the socialist countries. As NATO officials envisage it, a leading role is to be played by modified Boeings, as well as ground electronic intelligence services.

Judging from reports in the press, E-3A aircrews will be patrolling around the clock along the borders of the socialist countries, while aircraft based at West German airfields will be conducting radio and radar espionage against the GDR, Czechoslovakia, and Poland.

This was reported in detail by the Belgian newspaper SOIR. The radar equipment carried by AWACS aircraft enables NATO "to observe everything taking place in the airspace of the GDR, most of Czechoslovakia, and approximately 80 kilometers eastward into Poland. In addition to tracking air targets within a radius of approximately 400 km, an AWACS aircraft is capable of intercepting radio traffic, plotting the location of radar sites, and conducting surveillance of ground installations."

The subversive, aggressive directional thrust of the AWACS system is obvious. Nor do they deny this fact in NATO. Last summer, in spite of protests by local residents, an official ceremony was held at Geilenkirchen, announcing this NATO airbase as the main center for AWACS spy plane activities. Attending officials included NATO Secretary General J. Luns and the defense ministers of the member countries of this aggressive alliance. W. Penner, parliamentary secretary of state of the FRG Ministry of Defense, did his bit at this gathering to whip up a militarist psychosis. He declared that the AWACS aircraft were intended to "strengthen NATO's deterrent [ustrasheniye; also means frighten, intimidate] capability."

We should particularly note that AWACS aircraft have also been assigned another, even more sinister mission. They are also intended to guide to their targets the U.S. intermediate-range missiles which the United States and NATO intend to deploy in the countries of Western Europe, as well as for tactical control as airborne command posts. It has been reported in the press that their onboard computers can coordinate and direct several combat engagements simultaneously and can jam radar and communications channels.

Observers abroad note that deployment of the AWACS system, which is scheduled to be completed by 1987, constitutes another step in NATO preparations for a "limited" war in Europe. But just in Europe? After all, AWACS aircraft are operating in Southwestern Asia, in the Far East, wherever the U.S. military and its stooges are increasing militarist preparations. Since August 1982 "flying radars" have been participating in joint U.S.-Japanese military maneuvers close to the Far Eastern borders of the USSR.

The sinister shadows of U.S. spy planes in the skies above many countries are a reflection of the aggressive U.S. and NATO policy, of whipping up war hysteria, escalation of the arms race, and undermining of détente. The danger of this policy was stressed in the proceedings of the 26th CPSU Congress and other documents of the CPSU and Soviet Government. In conditions of a sharp aggravation of international tension, the fighting men of the Soviet Armed Forces are

increasing their military skills, heightening the vigilance and coordination of combat units, are strengthening discipline and order, and are placing a reliable obstacle in the path of the aggressive intrigues of imperialism.

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